Proinde

Loading soya beans in Brazil

Practical Guidance

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Content

Foreword

World's most consumed oilseed, soya bean is also Brazil's most cultivated and profitable crop and the main item on the export basket. Second only to iron ore in volume, soya bean exports increased almost two-fold the previous decade due to expansion of harvested area and use of advanced agricultural technology that boosted the productivity on the fields across the tropics.

The tariff dispute between the United States and China also contributed to Brazil becoming the largest producer and exporter of the annual legume, followed by the USA and Argentina. Long-term investments in land transport and port infrastructure, an abundance of arable land, and high-tech farming lend the conditions to consolidate Brazil's position as the leading supplier of the oilseed in years to come.

Although it has been half a century since soya bean exports kicked in, it was only recently that China surpassed Europe as the top destination for the ever-larger Brazilian shipments – and that the risks associated with the sea carriage of this commodity over longer distances expanded.

Transit time to Asia is more than twice that to most European ports, and soya bean is a living cargo with an inherent tendency to decay over time, as dictated by its moisture content and temperature. In recent years, sea carriers and P&I insurers have been faced with increasingly frequent claims or demands for security due to cargo deterioration during the voyage.

To assist our clients and associates in understanding better how the soya bean has become a vital commodity for the agribusiness and the domestic economy, we prepared this guide, which is divided into two parts for ease of consultation.

First, we quickly look at the history and importance of the versatile oilseed, its cultivation and production, and the journey of the beans from the fields in the countryside to the ports along the coast and in the Amazon, and from there to the other side of the globe. Then, we briefly explain the national grading standards and the framework for the quantification, loading and stowage of grain cargoes, as well as the liabilities involved.

Based on our hands-on experience, and following the guidelines of international authorities and leading P&I clubs, in this publication we also provide practical advice on main cargo risks in the face of local factors, and on best practices for safely loading and carrying the precious beans across the seas.

We hope this guide will be a useful source of reference and practical information, and we welcome your comments and suggestions for corrections and improvements. We will do our best to keep an updated version of this publication available for free download on our website.

REPRESENTAÇÕES PROINDE LTDA.
November 2020

1. Background

1.1. History of the soya in Brazil

The first seeds of soya beans [*Glycine max (L.)*] arrived from the United States to the state of Bahia in 1882, but the legume of the Fabacea family did not adapt well to the low latitudes and high temperatures of Northeast Brazil. From 1890, cultivars were brought to the southernmost state of Rio Grande do Sul in the 30th parallel south. Eventually, it was only from 1908, after the arrival of the first waves of Japanese immigrants bringing seeds through the port of Santos, that soya beans started to be cultivated for human consumption in Brazil[1].

Soya bean plantations were initially grown in the states of Rio Grande do Sul and Paraná and, to a lesser extent, areas in and around the states of São Paulo and Minas Gerais. From the 1960s, soya bean cultivars were enhanced and adapted to the lands of Central-West regions. Soya bean fields then expanded to the states of Mato Grosso, Mato Grosso do Sul and Goiás, which together account for nearly half of today's national production with potential for a substantial increase.

Picture 1: Soya bean plantation in the Cerrado region, Central-West Brazil. Source: pexels.com

From the mid-1970s, the Brazilian Agricultural Research Corporation (Embrapa)[2] joined forces with growers, traders and researchers in the private sector. They carried out extensive researches and development works to improve yield, flavour, proteinic content and resistance to diseases. Today, soya bean crops are grown sustainably in nineteen of the 26 states of the federation and the Federal District.

1.2. Cultivation

Soya bean plantations of varying sizes are scattered all over the country, with larger fields located in the central and southern parts of Brazil. The versatile oilseed supplies the domestic market with edible beans and cooking oil, biofuels, meal for animal feed, and is widely used in the food-processing industry. It remains Brazil's main agricultural product and export item in value, contributing decisively to a positive foreign trade balance. **[Figures 1 & 2]**

[1] "History of Soybeans and Soy Foods in South America, 1882-2009", 2009, by William Shurtleff, Akiko Aoyagi, Soyinfo Center

[2] *Empresa Brasileira de Pesquisa Agropecuária* - Embrapa (Brazilian Agricultural Research Corporation) operates under the purview of the Ministry of Agriculture, Livestock and Supply – MAPA. It was founded in 1973 to help develop the Brazilian agriculture and livestock

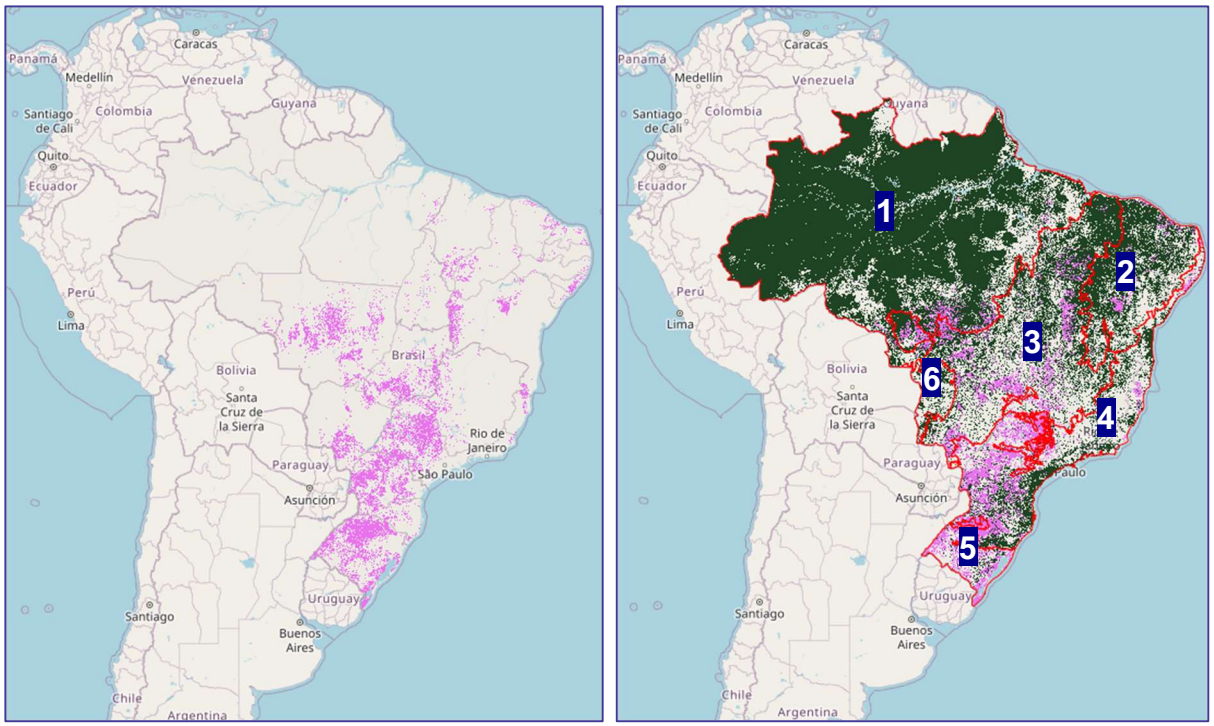


Figure 1 (Left): land used: pinkish areas represent land occupied with agriculture. Figure 2 (right): land used: greenish areas represent natural forest areas; pinkish areas are crops; red lines indicate the boundaries of the main Brazilian biomes (1. Amazon; 2. Caatinga; 3. Cerrado; 4. Atlantic Forest; 5. Pampa; 6. Pantanal). Source: MapBiomas Project

Planting and harvesting times differ considerably across the country. In the main producing areas below the 16th parallel south, sowing usually begins in October. It continues until December, for the beans to be harvested from late January or February through May. In the fewer Northern plantations, under the influence of the Amazon Biome, planting takes place from January to early June with harvesting from June to October, while in the Northeast region soya is sown from October to February and harvested from March to July. **[Table 1]**

Brazilian soya bean calendar

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
North	Planting	Planting	Planting	Planting	Planting	Planting/Harvesting	Harvesting	Harvesting	Harvesting	Harvesting		
Northeast	Planting	Planting	Harvesting	Harvesting	Harvesting	Harvesting	Harvesting			Planting	Planting	Planting
Central-West	Harvesting	Harvesting	Harvesting	Harvesting	Harvesting					Planting	Planting	Planting
Southeast		Harvesting	Harvesting	Harvesting	Harvesting					Planting	Planting	Planting
South		Harvesting	Harvesting	Harvesting	Harvesting					Planting	Planting	Planting

Table 1: Brazilian soya bean planting and harvesting seasons for the 2019/20 & 2020/21 crops. Source: CONAB

Over the last ten years, the planted area went from 21.1 million hectares (Mha) to 35.9 Mha, expected to grow to 36.9 Mha this season, driven by strong global demand and liquidity of this commodity on the back of the auspicious exchange rate. That is the largest soya bean planted area in the world, and the prospects are that it will grow even further to meet higher demand for domestic crushing for the biodiesel program. Soya bean productivity improved from 2.927 Kg/ha in 2009/10 to 3.379 kg/ha in 2019/20[3] and should be further developed with the increasing use of available and future technologies.

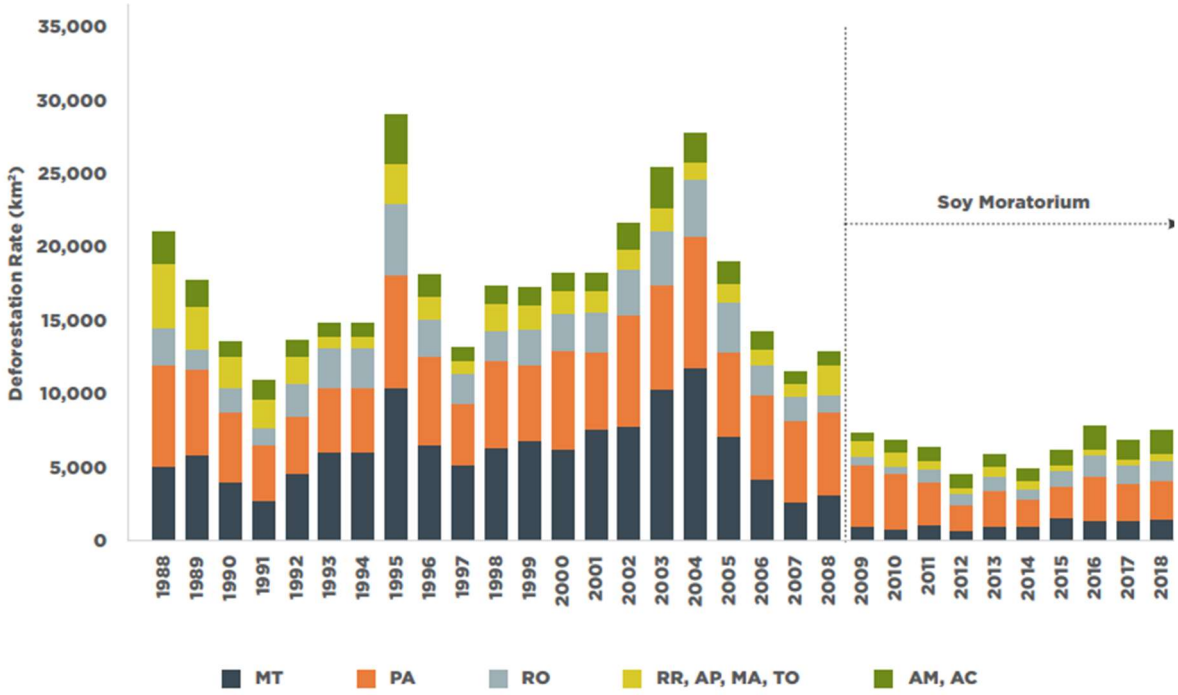
[3] "*Série Histórica das Safras"* (Crop Historic Series); "*Acompanhamento da Safra Brasileira de Grãos, v.7, Safra 2019/20, 12º Levantamento*" (Monitoring of the Brazilian Grain Harvest, v. 7 - 2019/20 Crop – Twelfth Survey, Sep 2020),2020, by CONAB [retrieved 19/10/20]

1.3. Environmental concerns

The Brazilian Forest Code of 2012[4] provides for the protection of the native vegetation, Permanent Preservation Areas (APP) and Legal Reserves. It imposes strict controls over the use and conversion of private land. Under the Forest Code, landowners cannot use more than 20% of land in Amazon forest area for agriculture or otherwise (without considering APPs, if any). Properties in the Cerrado Biome can use up to 65% of the land area, while elsewhere in the country it may be deforested up to 80% of the land for growing crops or pastures.

In 2006, the Brazilian Association of Vegetable Oil Industries (ABIOVE) and the National Association of Grain Exporters (ANEC) whose membership together makes up more than 90% of the Brazilian soya bean traders, entered a commercial pact called "Soy Moratorium". The agreement, precipitated by consumer market forces and supported by environmental NGOs and the government, provides for measures to prevent further suppression of native vegetation within the Amazon Biome. It includes a prohibition on the marketing and financing of soya grown in newly, illegally deforested land, with monitoring through field visits and strict satellite surveillance by the National Institute for Space Research (INPE), and a ban on the use of slave-like workforce in the fields.

With an initial term of two years, the Soy Moratorium was successively reinstated until 2016, when it was renewed indefinitely. The databases and satellite imagery gathered by the Soya Bean Working Group, formed by ABIOVE and ANEC members and civil society entities, are regularly analysed by the productive sector, federal agencies, and NGOs. Some soya farmers in the North and Northeast regions, notably those represented by the Brazilian Association of Soy Producers (Aprosoja), oppose the Moratorium, claiming that it offends the rights of landowners under the Forest Code to clear up to 20% of forest areas for farming.



Graph 1: deforestation rates in the Legal Amazon, highlighting the years before and after the Soy Moratorium. Source: ABIOVE/GTS

[4] The recent Law of Protection of Native Vegetation (Law 12,651 of 2012), also known as *Código Florestal* (Forest Code) establishes general rules for the protection of vegetation, Permanent Preservation Areas and Legal Reserve, forest exploitation, supply of forest raw material, control of forest products and control and prevention of forest fires

According to the latest Soya Moratorium report, the initiative contributed to a substantial reduction in the deforestation rate in the Amazon for soya fields and managed to confine lawful soya bean expansion to areas already cleared for pasturing or agriculture[5]. **[Graph 1]**

Regardless of the commitments of producers and the government for sustainable growth, the expansion of soya bean crops over the Cerrado biome, which occupies more than half of Brazil's harvested land, and in the neighbouring Amazon, still raises concerns from environmental groups on the potential for deforestation to meet the growing demand for the oilseed.

A recent study on the use of land for cultivation of soya beans in the Cerrado[6], promoted by ABIOVE, indicated that, if yields of the oilseed continue to rise for the next ten years, which is the long-term projection by the Brazilian Ministry of Agriculture, Livestock and Supply (MAPA), only one-fifth of the Cerrado's anthropised area, already cleared for pasture, would be enough to meet the demand for arable land without the need of deforesting.

In another new study on the eventual threats to the Amazon Biome, Embrapa concluded that there is no risk of increased deforestation in the region to cope with the surge in demand, since farmers can enhance productivity rates availing of advanced agricultural technology and reclaiming degraded pasture areas, taking advantage of environmental-friendly resources in use in the soya farming[7].

Pictures 2 & 3: (left) pods of soya beans in the Cerrado; (right) soya bean harvesting. Source: Pexels/Shutterstock

[5] "Soy Moratorium – Crop Year 2018/19, Monitoring Non-Compliant Plantations Using Satellite Images", 2020, by Soy Moratorium's *Grupo de Trabalho da Soja* - GTS (Soya Working Group), [retrieved 23/08/20]

[6] "Geospatial Analysis of Soy Crop in the Cerrado Biome: Expansion Dynamic, Agricultural Suitability, Evaluation System for Financial Compensation – 2001 to 2019", 2020, by Agrosatélite Applied Geotechnology Ltda. for ABIOVE

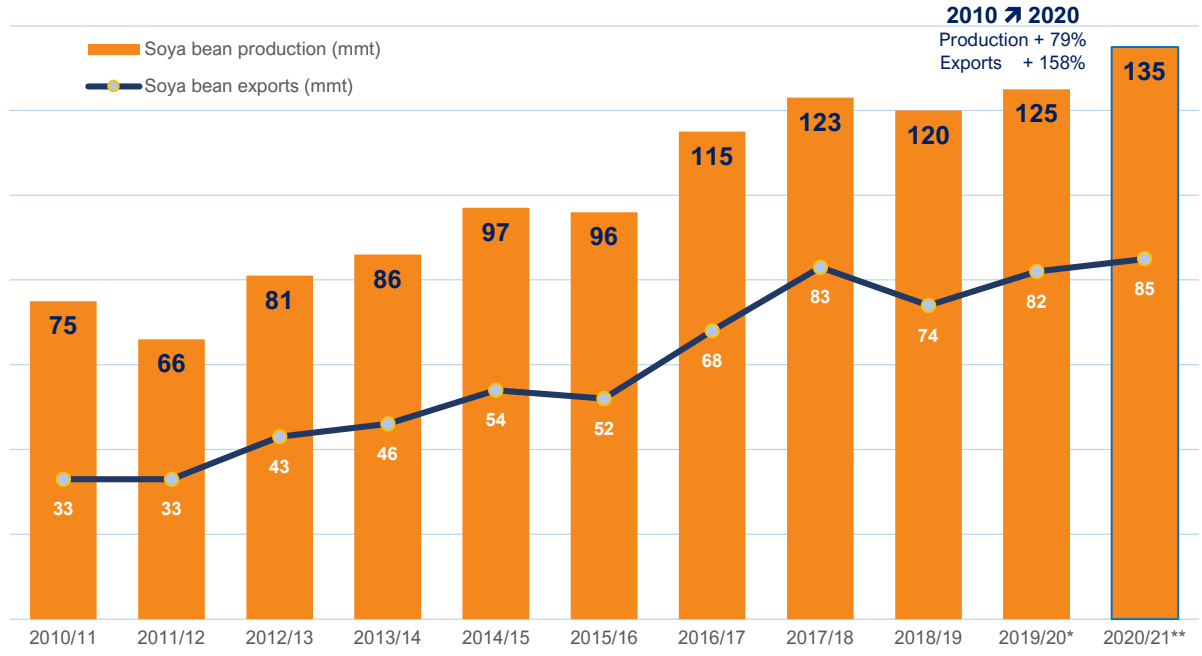
[7] "Does the Brazilian Soybean Production Increase Pose a Threat on the Amazon Rainforest?" (2019), by Décio Luiz Gazonni et al, Embrapa Soya Bean [retrieved 23/08/20]

2. Soya bean production

2.1. National production

According to the latest market analysis of the United States Department of Agriculture (USDA), global soya bean production will grow by 9.5%, reaching 369.5 million metric tons (mmt) in the 2020/21 season, with Brazil's share estimated to yield a record 134 mmt, nearly 36% of world production[8].

Most cultivated and profitable Brazilian crop, soya beans account for about a quarter of the gross value of national agricultural output. Soya bean production jumped from its first million metric tons (mmt) back in 1969 to a staggering 120 mmt in 2019. The National Supply Company (CONAB)[9] forecasts a record harvest of about 125 mmt in 2019/20. At the same time, the USDA predicts that Brazil will end this season with 126 mmt harvested, with the 2020/21 marketing season delivering over 134 mmt. In any case, Brazil will continue to reign as the world's largest producer and exporter of soya beans, seconded by the United States and Argentina[10]. **[Graph 2]**



Graph 2: Brazilian soya bean production 2010/11 to 2020/21, in mmt (* estimated, ** projected). Source: CONAB/SECEX/USDA

Mato Grosso (MT) is the third-largest state of the federation, though less than 2% of the population lives there. Besides being the leader in livestock production, the massive state is by far the major national producer of soya bean, among other crops, covering more than a third of the country's cultivated area. Yet, it has an abundance of arable lands to expand production without the need to deforestation.

Other key producing states are Goiás (GO) and Mato Grosso do Sul (MS), also in Central-West region; Paraná (PR) and Rio Grande do Sul (RS) in the South; and Minas Gerais (MG) and São Paulo (SP) in the Southeast. Plantations in the North and Northeast regions have also boomed in the last decade and continue to increment productivity rates annually, mainly in the states of Bahia (BA), Tocantins (TO), Maranhão (MA), Piauí (PI) and Pará (PA). **[Figure 3]**

[8] "Oilseed and Products Update - Brazil BR2020-0030", Jul 2020; "Oilseeds: World Markets and Trade, Global Market Analysis, Sep 2020; "Oilseed and Products Update - Brazil BR2020-0039" Oct 2020; and "World Agricultural Production, Circular Series WAP 11-20 Nov 2020, by the Foreign Agricultural Service of the United States Department of Agriculture (FAS-USDA) [retrieved 10/11/20]

[9] *Companhia Nacional de Abastecimento* – CONAB (National Food Supply Agency) is a public company under MAPA that controls and regulates the stocks of staple food and commodities

[10] Foreign Trade Secretariat (SECEX)'s ComexStat database; "*Série Histórica das Safras"* (Crop Historic Series), by CONAB. "*Acompanhamento da Safra Brasileira de Grãos, v. 8 – Safra 2020/21, n. 2 - Segundo Levantamento*" (Monitoring of the Brazilian Grain Harvest, v. 8, - Crop 2020/21, No. 2, 2nd Assessment, Nov 2020, by CONAB [retrieved 10/11/20]

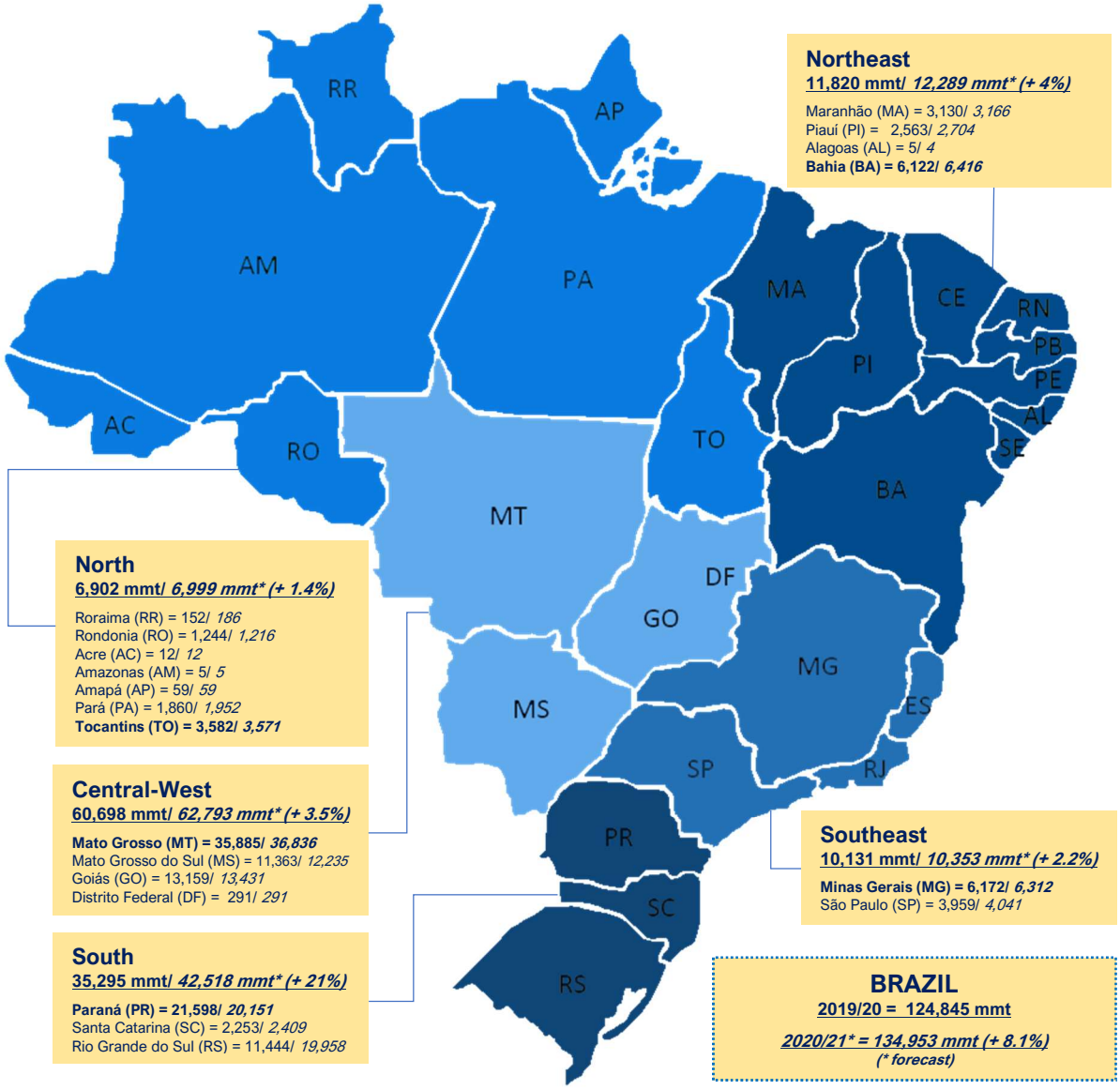


Figure 3: soya bean production in 2019/20 and 2020/21* *(* forecast*), in mmt. Source: CONAB

2.2. Domestic consumption and stocks

USDA predicts global soya bean consumption in the 2020/21 season around 371 mmt, up 4.6% from the previous season, with inventories at about 88.7 mmt. It also estimates Brazil's domestic consumption, basically entirely destined for the processing of oil and meal, at around 48.1 mmt, 3.5% more than in 2019/20, with Brazilian stocks remaining at about 20.6 mmt (up 1.3%)[11].

The increase in soya bean consumption is partly attributable to the escalating demand from Chinese hog industry, which is recovering its herds, after the outbreak of African Swine Fever hit the Asian country badly last year. Besides, Chinese pig farmers are migrating from traditional feeding with leftovers or agriproducts from small farms to better quality feed, such as Brazilian high-protein soya bean meal. The surge is also credited to the national biofuels industry, which in recent years has been government-mandated to blend soya oil with biodiesel at regulated rates, as well as price competitiveness amid the continued devaluation of the Brazilian currency, vis-à-vis the US dollar.

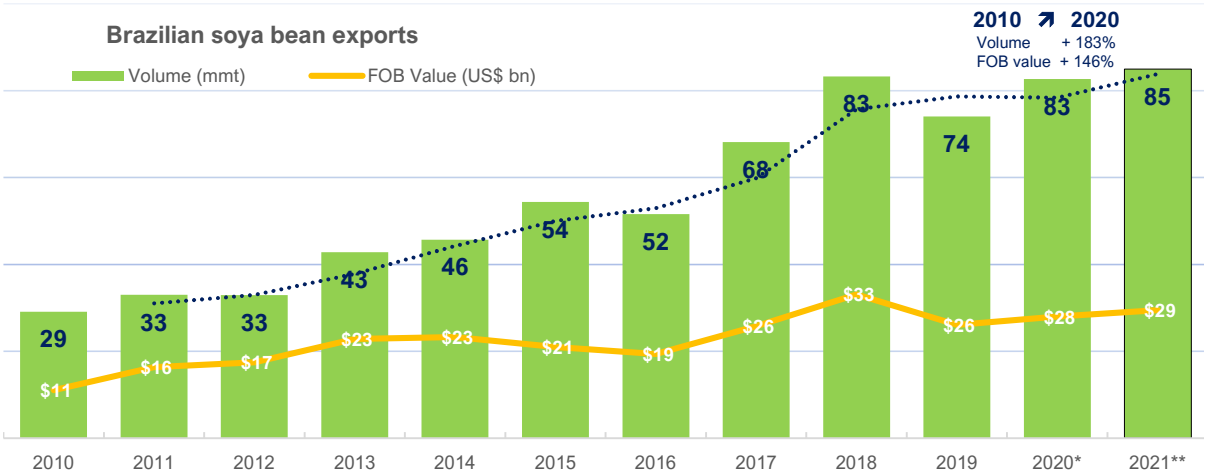
[11] "Oilseeds: World Markets and Trade, Global Market Analysis", Sep 2020, by FAS-USDA. "*Safra Mundial de Soja 2020/21 - 6º Levantamento do USDA*" (Bulletin on Soya Bean World Crop - 6th USDA Crop Assessment), Oct 2020, by *Federação das Indústrias do Estado de São Paulo* - FIESP (Federation of Industries of the State of São Paulo) [retrieved 10/11/20]

3. Soya bean exports

3.1. Export performance

USDA forecasts global soya bean exports to reach around 168 million metric tons (mmt) in 2020/21, a 2% increase over the previous marketing year[12]. Brazil is expected to sell up to 85 mmt next season and make up more than half of the world's soya bean exports predicted by the US agricultural agency[13].

Soya bean is the leading product on the Brazilian export basket in terms of gross income and only second to iron ore in export volumes. The historical series compiled by the Foreign Trade Secretariat (SECEX), indicates the volumes of Brazilian soya bean exports rose by about 183% over the last decade, coming from 29 mmt in 2010 to around 82 mmt by October 2020. At the same time, annual FOB sales grew 146%, from US$ 11.4 billion to US$ 28 billion until October 2020. **[Graph 3]**



Graph 3: soya bean export volumes (mmt) and values (US$ bn) from 2010 to 2020 (* estimated; **projected). Source: CONAB/SECEX

In 2019, Brazil shipped over 74 mmt of soya bean in bulk, three-quarters of which only to China, keeping the oilseed as the main item of exports, with 61% share in agriproducts and 11% in total exports. Sales last year grossed US$ 26.1 billion while the current season has comfortably surpassed 2019 revenues. By October 2020, around 81.4 mmt FOB valued at USD 28 billion had already been shipped[14]. **[Table 2]**

	Total FOB sales (US$ bn)		Weight (mmt)		Average FOB value (US$/t)		
Month	2019	2020*	2019	2020*	2019	2020*	Var. %
Jan	0.769	0.505	2.035	1.398	378	361	-4%
Feb	1.876	1.693	5.282	4.834	355	350	-2%
Mar	3.031	3.750	8.466	10.355	358	345	-3%
Apr	3.305	5.019	9.404	14.867	351	337	-4%
May	3.404	4.703	10.012	14.100	340	333	-3%
Jun	2.884	4.302	8.553	12.745	337	337	-3%
Jul	2.599	3.459	7.443	9.955	349	347	-2%
Aug	1.764	2.075	5.004	5.881	353	353	-2%
Sep	1.634	1,577	4.604	4.310	355	366	-2%
Oct	1.862	0.914*	5.076	2.493	360	366	-2%
Nov	1.808	-	4.947	-	365	-	-
Dec	1.191	-	3.270	-	364	-	-
Total	**US$ 26.1 bn**	**US$ 28 bn**	**74.1 mmt**	**81.4 mmt**	**US$ 352**	**US$ 344**	

Table 2: soya bean FOB export volumes (mmt) and revenues (US$ bn) Jan/19 to Oct/20 (* estimate). Source: ABIOVE

[12] Imports and exports figures may not balance due to differences in marketing years (MY), shipments in transit and reporting discrepancies. For example, USDA considers exports in the 2020/21 MY from Feb/21 to Jan/22

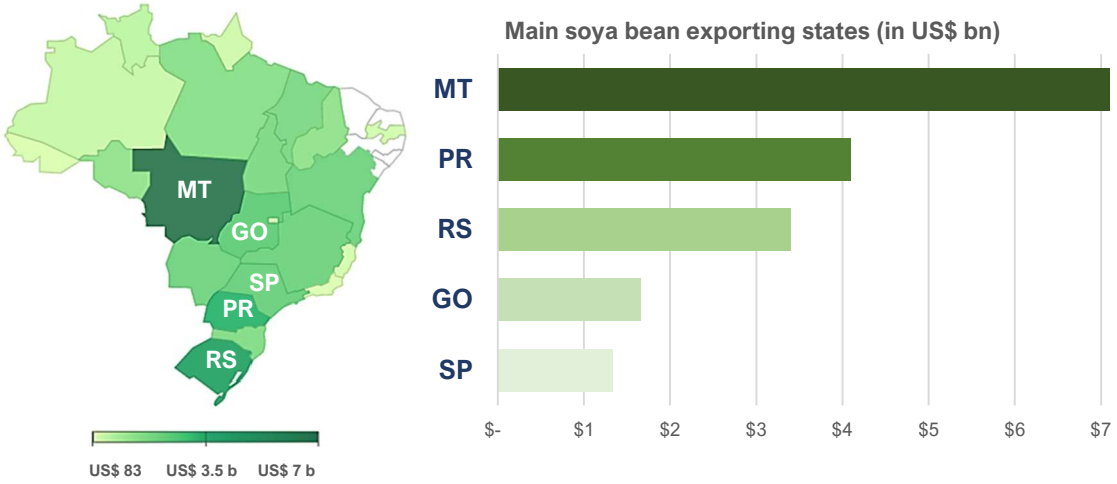
[13] Oilseeds: World Markets and Trade, Global Market Analysis, Sep 2020, by FAS-USDA. SECEX ComexStat database. Bulletin on Soya Bean World Crop - 6th USDA Crop Assessment, Oct 2020, by FIESP [retrieved 10/11/20]

[14] ComexStat database; ABIOVE database [retrieved 10/11/20]

Despite the drop in average FOB prices compared to last year, Brazilian farmers and traders are benefiting from the rise in domestic and international demand, with profits amplified by a sharp depreciation of the Brazilian real (BRL), which lost more than one-third of its value against the USD, at the same time of a rise in domestic soya bean prices[15]. The ongoing tariff dispute between the USA and China also has a medium-term impact on the boost of exports.

3.1.1. Main exporting states

Mato Grosso (MT), Paraná (PR), Rio Grande do Sul (RS), Goiás (GO) and São Paulo (SP) were the leading states in soya bean export volumes in the last marketing year. **[Graph 4]**



Graph 4: 2019 main soya bean exporting states by FOB sales, in US$ billion. Source: CONAB/SECEX

3.1.2. Main exporting ports

For the last five seasons in a row, Santos, on the coast of São Paulo, in the Southeast region, is the top national port complex for the export of soya beans, with the southern ports of Paranaguá and Rio Grande alternating the second and third positions. **[Table 3]**

Port Complex	State	2016	2017	2018	2019	2020 (*)
North and Northeast regions (Northern Arc ports)		**11.223 (21.8%)**	**17.916 (26.3%)**	**22.544 (26.7%)**	**22.628 (30.5%)**	**25.810 (31.7%)**
Itaqui (São Luis)	MA	3.850	6.128	8.199	8.119	8.634
Vila do Conde (Barcarena)	PA	2.187	4.463	5.495	5.413	7.306
Aratu (Salvador)	BA	1.408	3.169	3.667	3.174	2.897
Santarém	PA	1.695	1.878	2.486	2.813	3.708
Itacoatiara (Manaus)	AM	1.974	2.138	2.480	2,993	3.032
Others	--	0.108	0.141	0.216	0.116	0.234
South and Southeast regions (Southern Arc ports)		**40.313 (78.2%)**	**50.055 (73.7%)**	**60.714 (73.3%)**	**51.445 (69.5%)**	**55.628 (68.3%)**
Santos	SP	14.476	16.590	20.715	17.085	21.140
Paranaguá	PR	8.157	11.349	14.872	11.668	14.339
Rio Grande	RS	9.704	12.550	13.696	13.167	9.325
São Francisco do Sul	SC	3.962	4.718	5.599	4.518	5.419
Tubarão (Vitória)	ES	2.945	3.851	4.208	3.966	4.233
Others	--	1.069	0.997	1.626	1.040	1.172
	Total	**51.536**	**67.971**	**83.258**	**74.073**	**81.437**

Table 3: soya bean exports Jan/16 to Oct/20 (*estimate) by port complex, in mmt (share of exports in %). Source: ABIOVE/ComexStat

[15] From January to Oct/20, the exchange rate went from USD 1 = BRL 4.030 to USD 1 = 5.369 (33% depreciation of the BRL). São Paulo University's CEPEA- ESALQ/BM&F Price Index Paranaguá indicates soya bean prices in the domestic market went from BRL 87 per 60 kg sack in Jan/20 to USD 127 in Aug/20 (+ 46%). Source: Brazilian Central Bank/ESALQ/CEPEA database [retrieved 25/08/20]

Participation of the ports in the North and Northeast, collectively known as Northern Arc[16], went from 22% in 2016 to an estimated 32% in 2020, with emphasis on Itaqui and Barcarena. The market share of the Northern Arc ports is projected to rise steadily in the coming years, on the back of new port facilities and improvements of inland transport infrastructure through public-private investment programs. **[Section 3.4.2]**

3.1.3. Main buying countries

For the last five seasons, China remains by far the largest buyer of the Brazilian soya beans, followed by European Union members and other Asian nations. By the third quarter of 2020, Chinese's share of Brazilian soya beans imports dropped from 78.4% to 73.2% year on year. At the same time, the participation of the EU countries went from 7% to 10%. **[Table 4]**

Destination	2016		2017		2018		2019		2020*	
P. R. China	38.6	74.9%	53.8	79.0%	68.8	82.3%	58.0	78.4%	59.6	73.2%
European Union	5.3	10.4%	5.2	7.6%	5.1	6.1%	5.1	6.9%	8.2	10.1%
Asian countries (ex. China)	4.3	8.3%	5.3	7.7%	3.7	4.4%	4.9	6.6%	7.2	8.8%
Other destinations	3.4	6.6%	3.9	5.7%	6.0	7.2%	6.0	8.1%	6.4	7.9%
Total	**51.6 mmt**		**68.1 mmt**		**83.7 mmt**		**74.0 mmt**		**81.4 mmt**	

Table 4: soya bean sales (in mmt) and market share (in %), Jan 2016 to Oct 2020 (* estimate). Source: ABIOVE//ComexStat

3.2. Transport corridors

Soya bean shipments flow through four land corridors connecting the main producing centres in the hinterlands to seaports along the east and northeast coast of Brazil, by road or rail, and to riverine ports on the Amazon up in the north, by road and barge, through nine transport axes[17]. **[Figure 4]**

3.2.1. South Corridor

The soya beans harvested in the south and east of Mato Grosso, as well as in Mato Grosso do Sul, Goiás, São Paulo and Paraná are transported by road or rail to **Paranaguá**, in the Paraná Axis of the South Corridor. The port on the Paraná coast is as runner-up in soya bean exports and the top importer of fertilisers and other inputs in Brazilian agribusiness, with increased productivity in the last years. The smaller ports of **São Francisco do Sul** and **Imbituba**, in the neighbouring state of Santa Catarina, further south, also move significant amounts of soya beans and other agriproducts harvested in the southern fields.

Rio Grande, the southernmost Brazilian port, at the Rio Grande Axis and close to the borders with Uruguay, is also a key agricultural port, especially in the handling of soya beans and fertilisers to supply the local agribusiness. It is the only port complex in the Southern Arc served by inland waterways, the Lagoa dos Patos lagoon and the Uruguay River; it captures the soya bean production in the Southern states, mostly from the state of Rio Grande do Sul itself.

3.2.2. Southeast Corridor

Most of the grains originating from the Central-West states plus Minas Gerais and São Paulo is shipped abroad through **Santos**, Brazil's largest port in the Santos Axis of the Southeast Corridor. This corridor also flows part of the soya beans harvested in the Central-West and Minas Gerais through the port terminal of **Tubarão (Vitória)**, Espirito Santo, in the Vitória Axis.

[16] For more information, consult our "Brazil's Northern Arc Ports - Practical Guidance" downloadable on https://proinde.com.br/category/manuals/

[17] "*Corredores Logísticos Estratégicos: Complexo de Soja e Milho*" (Strategic Logistic Corridors: Soya and Corn Complex, 2017, by MTPAC, now MINFRA; DNIT database; ANTAQ statistics database; "Soybean Transportation Guide: Brazil 2019, Aug 2020, by USDA/AMS [retrieved 12/09/20]

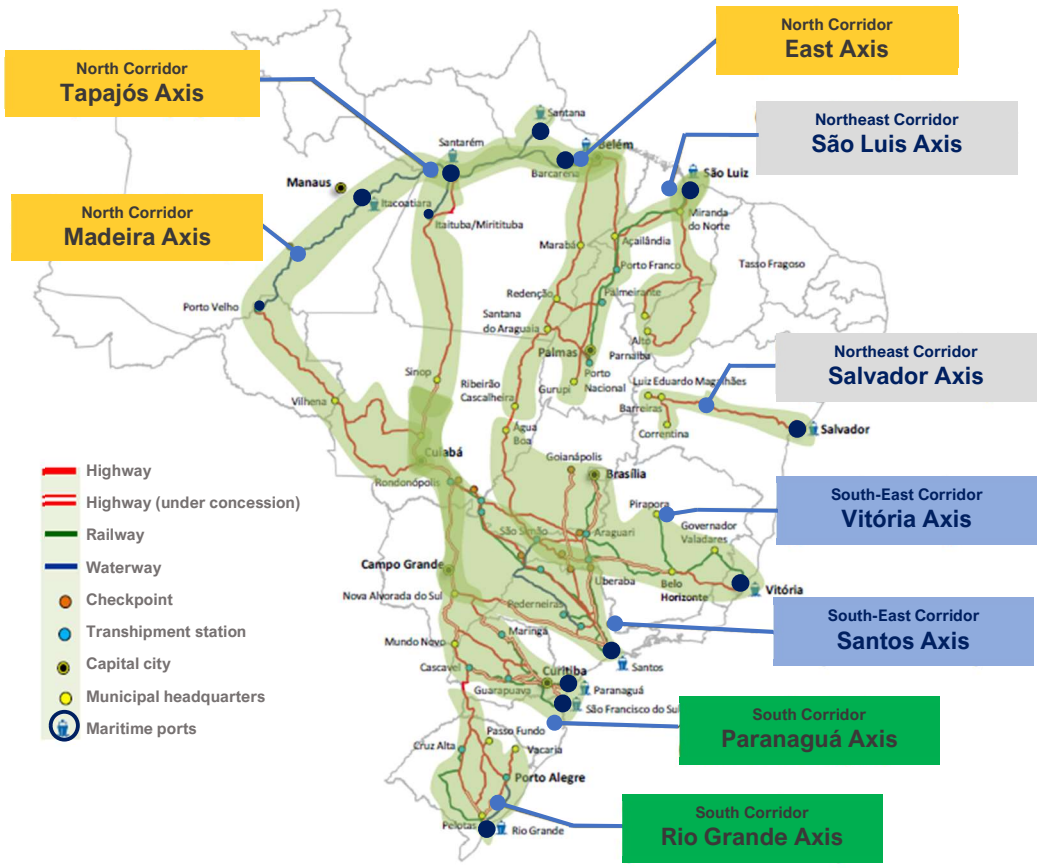


Figure 4: Brazilian soya bean transport corridors. Source: ANTAQ/IBGE/MINFRA(MTPAC)

3.2.3. Northeast Corridor

Northeast Corridor's São Luis Axis captures soya beans produced in eastern Mato Grosso, Pará, Goiás and the region known as Matopiba[18], by rail and road, to **Itaqui,** in São Luis. The port of Maranhão is moving ever-increasing volumes of agriproducts. It has just put into operation a new ship-loading system that should more than double its throughput, making it the largest grain port in the *Arco Norte* (Northern Arc) region. The public port of Itaqui also has the advantage over contender northern ports of not depending on the seasonality of the Amazon rivers, which has limited barge operations during the shallow waters of the drought period, as it relies on an extensive network of rail and road.

The Salvador Axis of the Northeast Corridor leads to the ports of **Aratu**, near Salvador, and **Ilhéus** further south. These ports in the state of Bahia ship relatively small volumes of soya beans mainly from Matopiba.

3.2.4. North Corridor

To the north, lorries full of soya beans drive through three logistical axes that link Mato Grosso and other fields in central and northern Brazil to barge stations and river ports in the Amazon. The Madeira Axis runs along federal highway BR-364. It leads to the ETCs[19] of **Porto Velho** on the Madeira River, state of Rondônia, from where barge convoys with soya beans and other agriproducts leave towards **Itacoatiara**, near Manaus (Amazonas), or further down to the ports of **Santana** (Amapá) or **Barcarena**, near Belém (Pará), at the mouth of the Amazon.

[18] The *Matopiba* region is made up of the abbreviations of the states of Maranhão (MA), Tocantins (TO), Piauí (PI) and Bahia (BA), which main crop is soya beans, with other crops like corn (maize), rice and cotton also playing an important role in this economic region

[19] Cargo Transhipment Station (*Estação de Transbordo de Carga* - ETC) is a private port facility for transhipment in the inland navigation or cabotage

The Tapajós Axis of the North Corridor extends from the city of Sinop, in the north of Mato Grosso, through the BR-163 highway, along the stretch called *Rodovia da Soja* (Soya Highway), which has been recently fully asphalted and reformed. This key road links major grain fields to the ETCs of **Miritituba**, district of Itaituba on the Tapajós River, where the soya is shifted from lorries to barges sailing down to **Santarém** (Pará), or further down the Amazon to the north of Marajó Island to reach the public port of Santana in Macapá, on the North Bar; or down south through the Breves straits to the private port terminals (TUPs)[20] of Barcarena (Pará). The less-used East Axis also connects the hinterlands to the ports of Vila do Conde in Barcarena and Belém.

Federal government's Investment Partnerships Program (PPI)[21] includes a greenfield project for the construction and operation, in vertical mode, of the *Ferrovia do Grão* - Ferrogrão (Grain Railway), officially named EF-170, that will run alongside the Soya Highway (BR-163). It should provide a more economical and environmentally friendly alternative for the sustainable flow of grains from northern Mato Grosso up the Tapajós Axis, further enhancing the throughput and competitiveness of the Northern Arc ports[22]. The auction is scheduled for 2021. **[Section 3.4.2]**

3.3. Export routes

Most of the Brazilian soya bean shipments in the last years, particularly those departing from the Southern Arc ports, have been sent to Chinese ports via Cape of Good Hope. Soya beans that leave the Amazon Ports and Itaqui have also been routed to various ports in China and Southeast Asian countries, sometimes through the Panama Canal. Shipments to China can take anywhere between 35 to 45 days, depending on the port of loading, speed, weather and navigation route chosen. The shortest sea passage – not necessarily the cheapest – is from Barcarena (or Santana), at the mouth of the Amazon, to Shanghai, via Panama Canal, while the longest is sailing from Rio Grande to Shanghai. **[Figure 5]**

Figure 5: Brazilian soya bean export main routes (no scale). Source: USDA/ANTAQ/ABIOVE/Sea.Distance.com/Ports.com

After China, the main buyers of the Brazilian soya beans are European Union countries. Shipments to Central Europe take an average of 14 to 20 days at sea to arrive. The shortest passage is from Barcarena (or Santana) to Hamburg via Cape Horn, the longest being from Rio Grande to the German port[23].

[20] Terminal of Private Use (*Terminal de Uso Privativo* - TUP) is a private port facility outside an organised port complex

[21] *Programa de Parceria de Investimentos* - PPI (Investment Partnerships Program) was created by Law 13,334/2016 to expand and accelerate the transfer between the State and the private sector to ensure improvement of the public transport infrastructures

[22] Ferrogrão (EF-170) will comprise about 933 Km of tracks between Sinop and Miritituba, plus a 177-Km extension from southern Sinop to Lucas do Rio Verde within Mato Grosso. Source: "*Cartilha Ferrogrão PPI - Concessão da Ferrogrão*" (PPI Ferrogrão Concession Leaflet), May 2020 [retrieved 02/09/20]

[23] Distances from main Brazilian soya bean exporting ports to Shanghai (China) via Cape of Good Hope and via Panama Canal, and Hamburg (Germany) via Cape Horn at a sailing speed of 13 knots. Source: Sea-Distances.com; Ports.com [retrieved 30/08/20]

3.4. Brazilian port system

Brazil has more than 7,500 Km of coastline[24], and over 90% of the country's foreign trade flows through the national port system. The Brazilian rivers, lakes and lagoons together add about 40,000 Km of navigable waters, of which almost half are commercially navigated inland waterways - 80% of them in the Amazon Basin alone.

Figure 6: soya bean exporting ports. Source: ANTAQ/MINFRA/ABIOVE

Under Brazil's Federal Constitution and the regulatory framework outlined in the Law of the Ports[25], the Federal Union is responsible for the administration, management, and exploration of the Brazilian port system. The shipping and port sectors fall under the purview of the Ministry of Infrastructure (MINFRA) under the regulation and surveillance of the National Agency for Waterway Transport (ANTAQ)[26].

[24] CIA World Factbook 2020 [retrieved 13/09/20]

[25] Arts. 21 & 22 of the Federal Constitution of 1988; Law 12,815 of 2013, the so-called *Lei dos Portos* (Law of the Ports) sets the guidelines for the exploitation by the federal government of the ports and port facilities operations. It is regulated by Decree 8,033/2013, as amended

[26] The policies and directives formulated by the *Ministério da Infraestrutura* – MINFRA (Ministry of Infrastructure) to the Brazilian port and waterways systems are implemented by *Agência Nacional de Transportes Aquaviários* - ANTAQ (National Agency for Waterways Transport), the agency that regulates and oversees the quality of services rendered in the waterborne transport of goods and passengers, ports and port facilities

The main cargoes handled throughout Brazilian port system last year comprised of iron ore (44% share), soya beans (9.2%), oil and derivatives (5.4%) and maize (corn) (5.2%). Seaborne exports consisted primarily of iron ore (56%), soya beans (11%) and corn (6.5%)[27].

3.4.1. Southern Arc ports

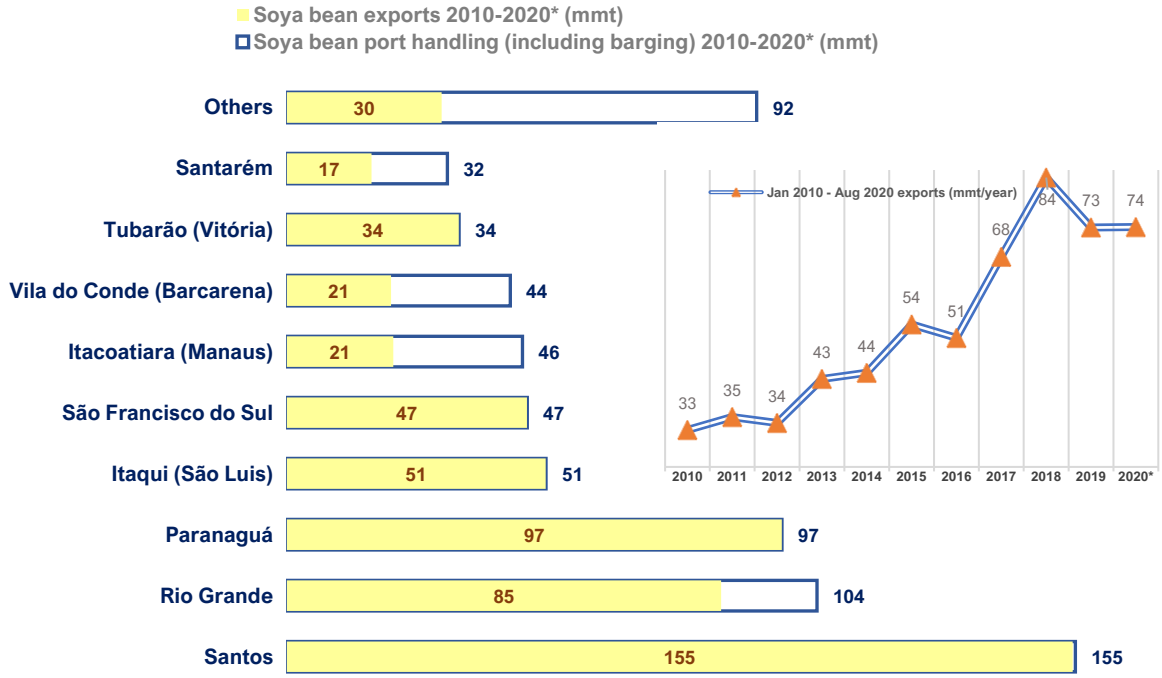
Ever since regular soya exports started to boom in the late 1970s, the seaports in the most populous and industrially developed part of Brazil have dominated the port handling and exports of the oilseed in terms of volumes. Soya bean exports accumulated in the last ten years were shipped through 13 different port complexes, mostly Santos (26%), Paranaguá (17%) and Rio Grande (15%) in the Southeast and South Corridors. **[Figure 6, Graph 5]**

3.4.2. Northern Arc ports

The region known as Northern Arc consists of the producing areas and outlet ports above the 16° parallel south, comprising all the North and Northeast regions and part of the Central-West, enclosing sixteen of Brazil's twenty-six states.

Although the Southern Arc ports remain the top agriproduct exporters, the surge in demand has caused logistical bottlenecks in these traditional bulk ports, leading to the development of the river ports of the Amazon as well as the seaports in the Northeast region, as an alternative to outflow the amplified agricultural production.

The competitiveness of the Northern Arc ports will be further enhanced with the construction of the Ferrogrão railroad, in the Tapajós Axis. Also, currently under study a north-western extension of the North-South Railway[28] is planned to link up Açailândia in the state of Maranhão to the public port complex of Vila do Conde and the grain elevators of Barcarena in Pará.



Graph 5: Accumulated soya bean port handling and exports (Jan 2010 to Jun 2020) with yearly exports, in mmt. Source: ANTAQ

[27] *Anuário Estatístico ANTAQ 2019* (ANTAQ Yearbook 2019), by ANTAQ; ANTAQ online statistics database [Retrieved 30/08/20]

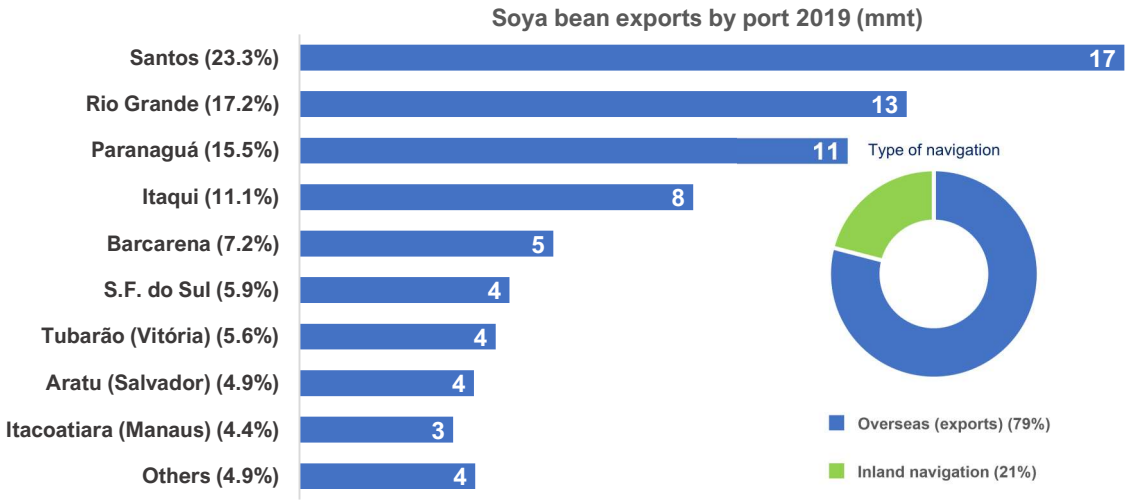
[28] The *Ferrovia Norte Sul* - FNS (North-South Railway), EF-151, is a federal concession running along the North-South axis and currently spanning about 1,537 Km of tracks linking Anápolis in the grain and livestock state of Goiás to Açailândia in Maranhão, where it connects with the Carajás Railroad towards Itaqui and Ponta da Madeira, also in Maranhão

3.5. Soya bean port handling

Over the past ten years, Brazilian ports have collectively handled more than 700 mmt of soya beans in bulk, 20% of which have been reworked in transhipments from trucks to barges and from barges to silos or ships in the inland waterways. Since 2010, about 582 mmt of the oilseed have been exported in increasing quantities year after year[29]. **[Graph 5]**

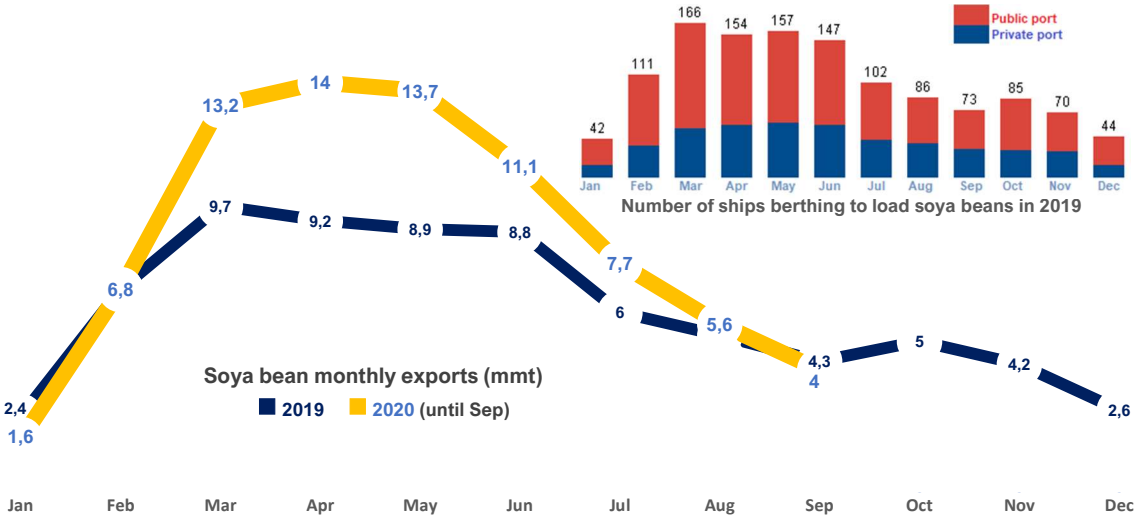
3.5.1. Exports by port

In 2019, about 92 mmt of soya beans were handled in the Brazilian port system, 21% of which in barges shuttling between inland waterways and river ports. Around 73 mmt of this volume were exported through nine port complexes, 64% of them comprising of organised public ports and 36% of private use terminals (TUPs). **[Graph 6]**



Graph 6: Soya bean exports by port complex (in mmt/%), type of port facility and type of navigation. Source: ANTAQ

Soya beans harvested between January and October across Brazil's five regions were shipped all year in 2019, with lowest volumes recorded in January (2.4 mmt) and highest in March (9.6 mmt), an average export rate of 6 mmt per month. Fewer vessels berthed in January (42) than in March (166) with around one hundred bulk carriers berthing per month, in 1,237 calls for loading of soya beans, with each vessels carrying an average of 59,000 m/t of the product. **[Graph 7]**



Graph 7: Monthly exports 2019-2020 (* until Sep) and number of ships berthing to load soya beans in 2019. Source: ANTAQ

[29] ANTAQ online statistics database [Retrieved 21/11/20]

3.5.2. Exports by loading facility

North Region

The port facilities scattered along the North Corridor together handled nearly 29 mmt of soya beans in 2019, 60% of which comprising of barge convoys from ETCs down the Madeira and Tapajós rivers to the ports along the Amazon. Exports from the region last year totalled 11.4 mmt, while volumes in the first half of this year had already surpassed 12 mmt.


North Region

The leading exporting port facilities in the North region were Amaggi's *Terminal Graneleiro Hermasa* (Hermasa) in **Itacoatiara** (28%), near Manaus in the state of Amazonas, Cargill's *Terminal Fluvial de Granéis Sólidos de Santarém* (Cargill TGS) in the public port of **Santarém** (17%), Pará, followed by Hidrovias do Brasil's *Terminal Vila do Conde* (Hidrovias do Brasil) (16%), Glencore/ADM's *Terminal de Grãos Ponta da Montanha* (TGPM) (16%), and Amaggi/Bunge joint venture Unitapajos' *Terminal Portuário Graneleiro de Barcarena-Terminais Portuários Fronteira Norte* (Terfron) (14%) in **Barcarena**, Pará. **[Figure 7]**

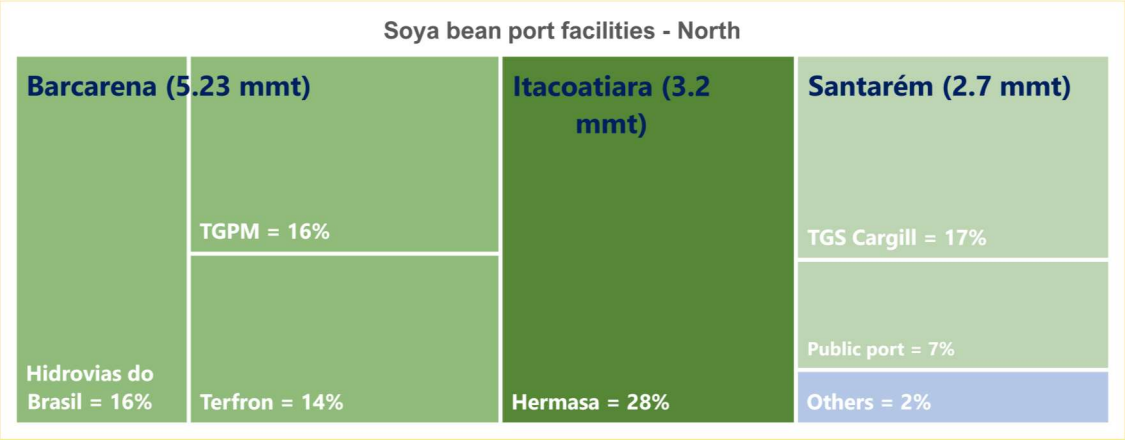


Figure 7: Soya bean export shares in the ports of the North region in 2019. Source: ANTAQ

Northeast Region

Terminal de Grãos (Tegram), in the public port of Itaqui, dominates soya bean shipments in the São Luis axis of the Northeast Corridor, in Maranhão. Brazil's second-largest soya bean port facility in 2019 in terms of volumes, Itaqui shipped 69% of the oilseed exports from the Northeast region, the balance being loaded from the private port of *Terminal Portuário Cotegipe* (Cotegipe) in **Aratu**, near Salvador, state of Bahia. **[Figure 8]**


Northeast Region

There has been a downturn in the soya bean shipments from Aratu in this exporting season. At the same time, Itaqui has been beating productivity records. In the first half of 2020, it registered a 20% increase, due to further grow over the year as it just enhanced its ship-loading capacity.

Figure 8: Soya bean export shares in the ports of the Northeast region in 2019. Source: ANTAQ

Southeast Region

Except for VLI's *Terminal Integrador Portuário Luiz Antonio Mesquita* (Tiplam) in the Piaçaguera channel, and *Sucocítrico Cutrale* (Cutrale), in Guarujá, the remaining soya bean loading facilities in the port of **Santos**, São Paulo, are public and controlled by the state-owned Santos Port Authority. Private companies operate these public facilities under lease agreements and concessions.


Southeast Region

The port complex of Santos remains the leading exporter of the oilseed, being responsible for over 23% of all soya beans shipped by Brazil, and 81% of the volumes from the Southeast last year. The remainder 19% was exported through Vale's *Terminal de Tubarão* (**Tubarão**) near Vitória, the only soya bean port facility in Espirito Santo. There are none in the neighbouring state of Rio de Janeiro.

In the 2019 exporting season, 21% of the soya bean exports of the Southeast region were shipped from the public port of Santos[30], followed by Cosan's *Teaçu 2* and *Teaçu 3* terminals (Teaçu), which together shipped 28%, Tubarão (19%), Cargill/LDC's *Terminal de Exportação de Açúcar do Guarujá* (Teag) (10%), Tiplam (10%), and Amaggi/Bunge/Rumo's *Terminal de Granéis do Guarujá* (TGG) (9%), Cutrale (7%) and, finally, Cargill/LDC's *Terminal Exportador do Guarujá* (Teg) shipping 5% of the soya beans in the region. **[Figure 9]**

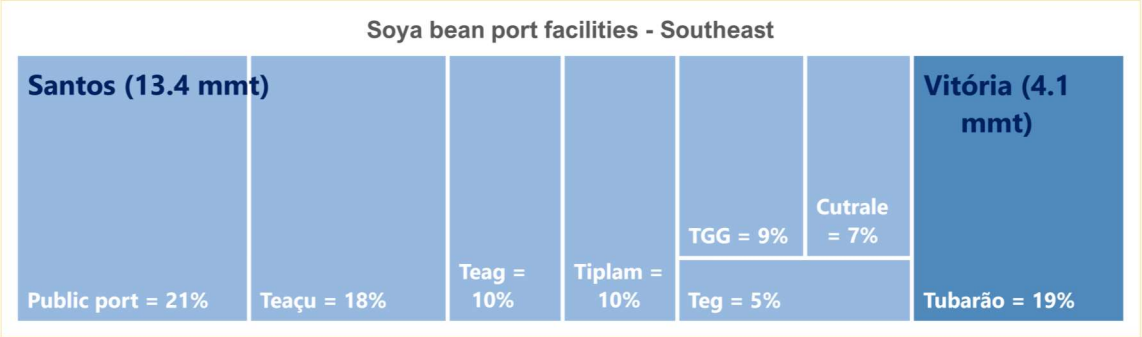


Figure 9: Soya bean export shares in the ports of the Southeast region in 2019. Source: ANTAQ

South Region

The port of **Paranaguá**, administered by the state of Paraná through the *Administração dos Portos de Paranaguá e Antonina* (APPA), shipped 39% of the soya beans flowed through the Southern Corridor, a little less than the rival port of **Rio Grande** in Rio Grande do Sul, which private and public terminals combinedly covered 43% of the shipments from the South in the last season.


South Region

The ports of **São Francisco do Sul** and **Imbituba** in Santa Catarina contributed with 15% and 2%, respectively, to the southern soya bean export volumes of 2019.

Paranaguá's Export Corridor was the leading soya bean port facility, with a 15% share of all exports of 2019. In the South region, it moved 37% of the shipments, seconded by CGG Trading's *Terminal Graneleiro S/A* (Tergrasa) of Rio Grande (21%), and the public port of São Francisco do Sul (15%). The private facilities of *Terminal Bianchini* (Terbian) (11%) and *Terminal Marítimo Luiz Fogliatto* (Termasa) (7%), both in Rio Grande also moved significant volumes in the area. **[Figure 10]**

[30] Included in the public port of Santos there are the leased facilities of Terminal Açucareiro Copersucar (TAC), T-Grão, and Export Corridor

In the first half of 2020, the volumes shipped from the southern ports were over 49% more than the same period last year, with emphasis on Paranaguá which has been hitting successive records of soya bean exports.

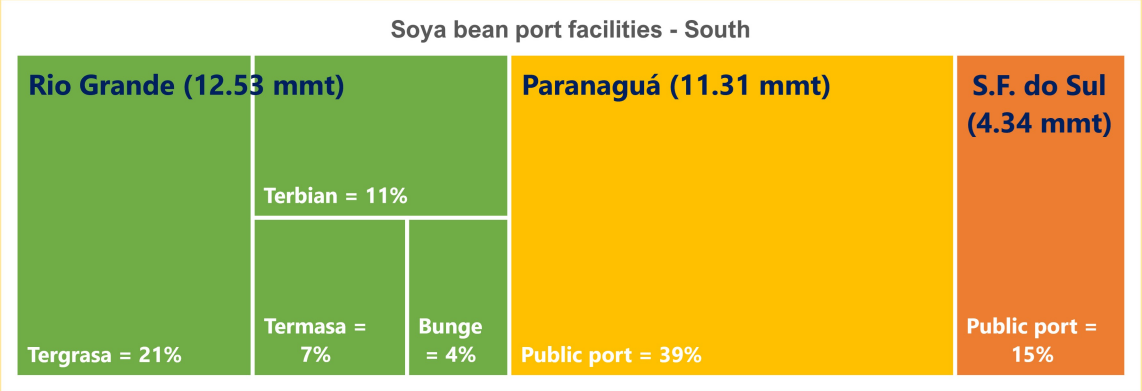
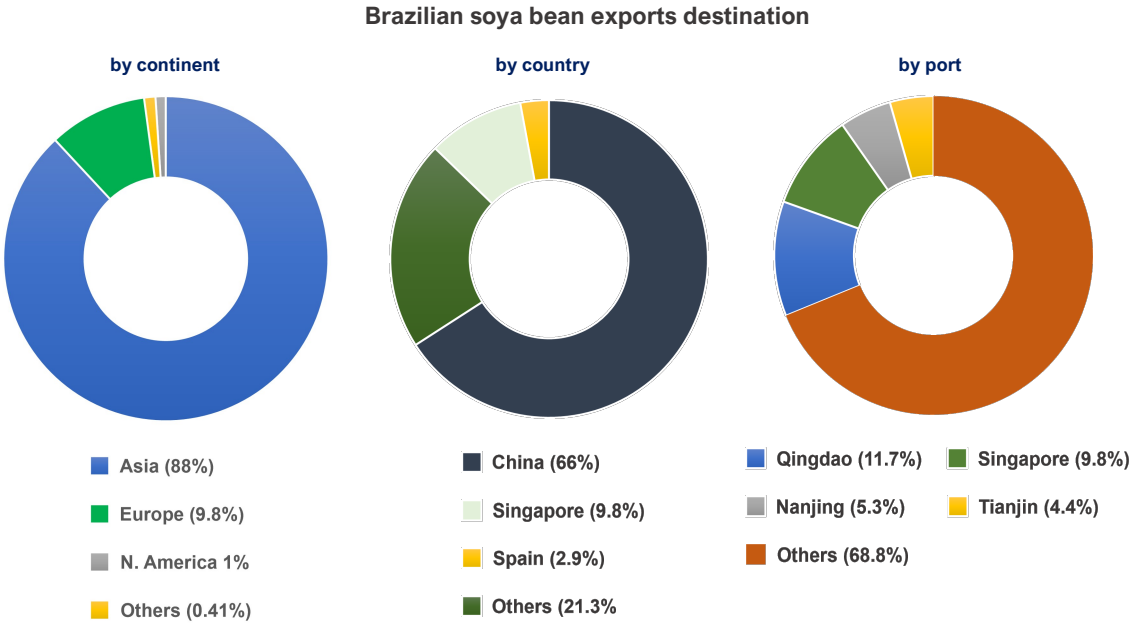


Figure 10: Soya bean export shares in the ports of the South region in 2019. Source: ANTAQ

3.5.3. Exports by destination

In the 2019 exporting season, Brazil sent soya bean shipments to over 150 ports in 42 different states in every continent but Antarctica.



Graph 8: Soya bean exports destination 2019 (in %) by continent, country and port. Source: ANTAQ

Following the trend of the last decade, 88% of the 73 mmt of soya beans exported by Brazil in 2019 went to Asia, mostly to Chinese ports and Singapore[31]. **[Graph 8]**

[31] *Anuário Estatístico ANTAQ 2019* (ANTAQ Yearbook 2019), by ANTAQ; ANTAQ online statistics database [Retrieved 07/09/20]

4. Soya bean grading

4.1. Legal framework

Federal laws govern the grading of vegetable food. Grading of agriproducts is mandatory when intended for direct human consumption, subject of sales contracts with the government or imported into Brazil[32].

The Ministry of Agriculture, Livestock and Supply (MAPA), through Normative Instruction 11 of 2007 (IN 11/2007)[33], lays the groundwork of Brazil's soya bean grading standards, outlining the requirements for determining the identity and quality of the oilseed and describing the methods for sampling, marking, and labelling the product. This technical regulation also defines defects and non-conformities and the respective maximum tolerances.


Picture 4 & 5: Cargo of soya bean being unloaded to a grain elevator. Source: Shutterstock/Proinde

4.2. Official grading

Brazilian soya bean is classified into "Group I" (for *in natura* consumption) and "Group II" (for other uses, such as crushing for meal and oil or export). As for colour, the oilseed is divided into two classes, "Yellow" (beans with yellow, green, or pearly tegument, whose inner part is yellow, yellowish, clear, or whitish) and "Mixed" (beans other than Yellow). It is also categorised into different types, according to the qualitative and quantitative percentages of defects found[34]. **[tables 5 & 6]**

Group I – soya bean intended for fresh consumption (in %)

Type	Damaged				Greenish	Split, broken and crushed	Foreign matter and impurities
	Total sour and burned	Burned - maximum	Mouldy	Total*			
1	1.0	0.3	0.5	4.0	2.0	8.0	1.0
2	2.0	1.0	1.5	6.0	4.0	15.0	1.0

Group II – soya bean for other uses (in %)

Type	Damaged				Greenish	Split, broken and crushed	Foreign matter and impurities
	Total sour and burned	Burned - maximum	Mouldy	Total*			
Basic standard	4.0	1.0	6.0	8.0	8.0	30.0	1.0
* sum of burned, sour, mouldy, fermented, germinating, damaged, immature, and shrivelled beans							

Table 5: soya bean maximum tolerance limits for defects (in %), according to MAPA IN 11/2007. Source: MAPA/CONAB

[32] Arts. 1 to 3 of Federal Law 9,972 of May 2000, which establishes the food grading of vegetable products, subproducts and residues with economical interest as regulated by Decree 6,268 of 2007

[33] MAPA *Instrução Normativa* - IN (Normative Instruction) N° 11 of 2007 (MAPA IN 11/2007), as amended by MAPA IN 37/2017

[34] Arts. 1 to 11 of MAPA IN 11/2007

MAPA IN 11/2007 and related regulations detail the procedures to be adopted for inspecting, sampling, grading, and testing the soya for moisture content. It restricts the use of beans with "serious defects", depending on the proportion and severity. At the same time, the agricultural authority permits unrestricted marketing and consumption of beans graded with "light defects"[35]. **[Table 6; Pictures 6 & 7]**

Bean condition	Definition
	Serious defects
Burned	Beans or pieces of beans that are carbonised
Sour	Beans or pieces of beans visibly fermented in their entirety and with marked dark brown colour, affecting the cotyledon
Mouldy	Beans or pieces of beans with fungi (mould or mildew) visible to the naked eye
	Light defects
Fermented	Beans or pieces of beans that, due to fermentation process, underwent a visible change in the colour of the cotyledon other than the one defined for sour beans
Germinating	Beans or pieces of beans that visibly has a radicle
Damaged	Beans or pieces of beans altered and deformed, with spots in the pulp, perforated or attacked by diseases or insects, in any of their evolution phases
Immature	Oblong-shaped beans that are intensely greenish, as they have not reached their full physiological development, and can be wrinkled
Shrivelled	Beans with an irregular shape that are wrinkled, atrophied and devoid of internal mass
Crushed	Beans that are crushed, with the cotyledons and integument broken by mechanical damage, excluding beans that have their integument cracked
Split and broken	Pieces of beans, including the cotyledons, that are retained in a sieve with round holes of 3 mm ⌀
Greenish	Beans or pieces of beans with complete physiological development with a greenish cotyledon

Table 6: soya bean defect grading in order of seriousness, according to MAPA IN 11/2007. Source: MAPA/CONAB

Pictures 6 & 7: soya bean with serious defects (left) and light defects, according to MAPA IN 11/2007. Source: MAPA/O Classificador

[35] "*Referencial Fotográfico dos Defeitos da Soja*" (Photographic Framework of Soyabean Defects), 3rd Edition, 2008, by CGQV-DIPOV/MAPA

The soya bean must be physiologically developed, healthy, clean, dry and free from foul, offensive odours; otherwise, it cannot be sold for fresh consumption and will have to be processed and reclassified. Beans in poor conditions or with the presence of live or dead insects, or substances harmful to health, will be disqualified for human consumption[36].

4.3. Commercial grading

Most of soya bean shipments from Brazil are sold through contracts drafted by the Brazilian Association of Grain Exporters (ANEC), standardised as ANEC 41 (FOB contract for parcels) and ANEC 42 (FOB contract for full cargo) forms.

ANEC 41/42 contracts provide that quality and condition are final at the time and place of loading with laboratory analysis and grading performed by a superintendent or analyst member of the Federation of Oils, Seeds and Fats Associations Ltd. (FOSFA) registered at MAPA, according to the IN 11/2007 standards. Other outstanding issues regarding quality, terms and conditions are resolved under Brazilian law or, when not contradictory, following the standard soya bean contract drawn up by FOSFA[37].

The quality and condition specifications under ANEC's widely adopted contracts are similar to those of IN 11/2007 for Group II soya beans. **[Table 7]**

Regulation	Oil content	Moisture content	Foreign matter	Damaged beans	Broken beans	Greenish beans
ANEC 41/42	**Basis 18.5%** non-reciprocal allowance of 1% for each 1%, fractions in proportion	**Max. 14%** (mandatory)	**Basis 1%, max. 2%** non-reciprocal allowance of 2% for each 1% deficiency, fractions in proportion	**Basis 8%, max. 8.5%** non-reciprocal allowance 2:1, fractions in proportion of which max. 4% heat damaged and burned (max. being 1% burned) and 6% mouldy	**Max. 30%**	**Max. 8%**
IN 11/2007	Not determined	**Max 14%** (recommended)	**Max. 1%**	Group I: **Max. 6%** being 2% for heat-damaged and burned (being max. 1% burned) and 1.5% mouldy	**Max. 15%**	**Max. 4%**
				Group II: **Max. 8%** being 4% heat-damaged and burned (max. being 1% burned) and 6% mouldy	**Max. 30%**	**Max. 8%**

Table 7: soya bean maximum tolerance limits comparison between MAPA IN 11/2007 and ANEC 41/42 contracts. Source: MAPA/ANEC

ANEC contracts specify a maximum moisture content (MC)[38] of 14% while IN 11/2007 only requires that the MC be tested but does not take this parameter into account for typing the beans. Nonetheless, MAPA recommends a maximum MC of 14%; if this limit is exceeded, an observation must be made by the grader[39].

Neither ANEC nor MAPA makes any stipulations for cargo temperature, although this parameter is generally checked by most electronic moisture meters during the test to determine the MC. **[Sections 7.1.1 & 7.2.3]**

[36] Exports of soya beans with limits beyond tolerance may be authorised provided this condition is contractually agreed and the exporter undertakes to respect the legislation of the country of destination (MAPA IN 15/2004)

[37] Brazilian Soybeans F.O.B. Contract for Parcels N° 41 and Brazilian Soybeans F.O.B, Contract for Full Cargo N° 42, revised and effective from 01/07/20, drafted by the National Association of Grain Exporters – ANEC. ANEC standard contracts are governed by English law with disputes resolved in London in accordance with FOSFA's arbitration rules [retrieved 07/09/20]

[38] Moisture content is the percentage of water found in the product sample free of foreign matters and impurities, determined by official method or by apparatus that produces an equivalent result, as defined in MAPA IN 11/2007

[39] Clause 3.1 of ANEC 41/42; arts. 4, § 4, and 23 of MAPA IN 11/2007

4.4. Official sampling method

The taking of samples from conveyances (lorries, train wagons or vessels) for grading purposes must be carried out at points distributed evenly and randomly across the entire cargo compartment. The lot size determines the minimum number of sampling points, and the collection must reach the upper third, the middle and the lower third of the compartment. The sampled product must be homogenised, quartered, and reduced to 3 kg to make up at least three 1-kg samples representative of the lot[40].

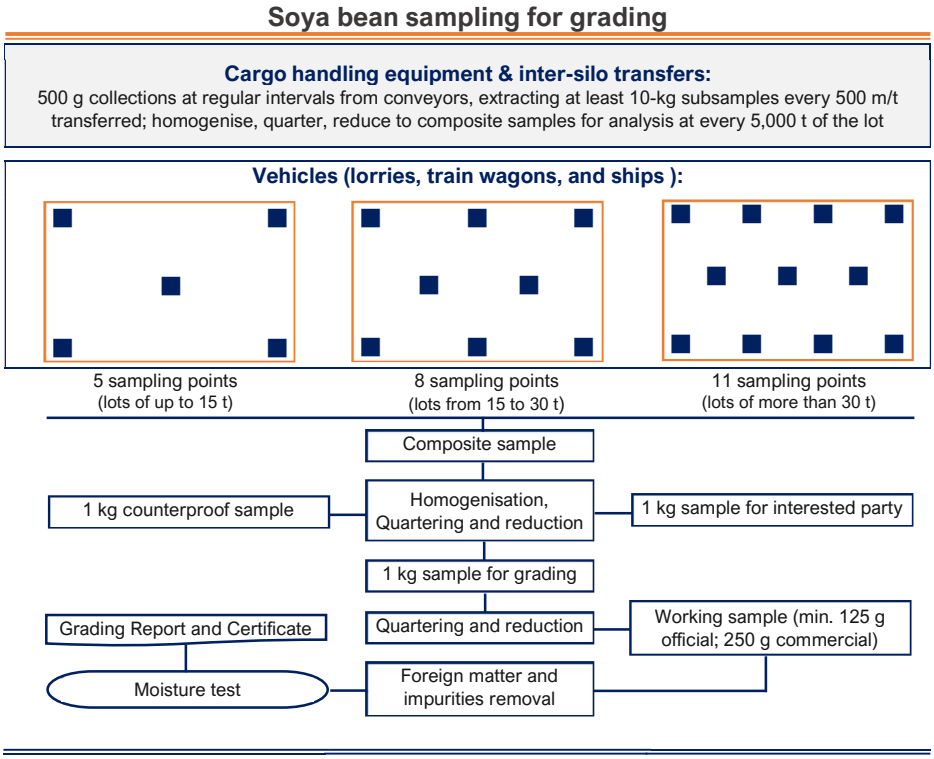


Table 8: soya bean sampling for official grading and MC testing according to MAPA IN 11/2007. Source: MAPA/CONAB

For sampling out of cargo handling equipment or during inter-silo transfers with the beans in motion, the collection must be made in increments of 500 g off the conveyor belt, making up at least 10 kg of beans for each fraction of 500 t (subsample), at regular intervals of equal time, according to the throughput of the cargo handling facility. For every 5,000 tonnes of beans shifted, ten subsamples of 10 kg must be added, homogenised, and quartered down to three 3-kg of the product, to compose at least three 1-kg samples. Same applies for cargo sampling in silos and warehouses. **[Table 8]**

The three sets of samples representative of the lot must be adequately packed, sealed, identified, and authenticated. Once the grading and test for moisture content are completed, the grading report and certificates are issued by the MAPA-accredited grader[41]. **[See Section 8.2.1]**

[40] Arts. 12 to 31 of MAPA IN 11/2007

[41] The first set of sample to be delivered to the interested party, the second held as counterproof (to remain suitably stored for at least 45 days), and the third sample used for the grading after reduced to a working sample of at least 125 g – or 250 g for commercial grading. From the remainder of the 1-kg working sample intended for grading, a subsample is reduced, and foreign matter and impurities removed for determining the MC

5. Soya bean quantification

5.1. Customs quantification

Brazil's federal laws do not stipulate how solid bulk cargoes are quantified during loading or unloading from vessels. On the other hand, the Special Department of the Federal Revenue of Brazil (RFB) (customs authority) regulates the methods for quantifying imports and exports of bulk cargoes for customs control and taxation purposes.

RFB's regulation recognises weighing (road or rail weighbridges, intermittent and continuous flow scales), direct measurement (automated devices for measuring cargo flow), and mensuration (draft survey) as acceptable means of quantifying bulk cargoes[42]. The method applying in each customs-bonded port facility is established locally by the chief inspector of the Customs House.

The direct, automated measurement by an independent surveying company is customs authority's favoured method. When a customs-appointed expert carries out the quantification, shore measurements performed by the terminal are excluded, unless the chief customs inspector with jurisdiction justifiably orders shore figures to prevail[43]. **[See Sections 7.3 & 8.3]**

Picture 8: Cargo of soya bean being loaded on a bulk carrier. Source: Proinde

5.2. Commercial quantification

ANEC's standard contracts (forms 41 & 42) provide that cargo weight is "*to be final at time and place of shipment per certificate(s) issued by the Independent Surveyor at Seller's option and account, based on figures ascertained by official shore scales. In case official shore scale is not available at loading terminal, custom's Draft Survey figures will be final*"[44]. The buyer can request a joint weight check, at its expense and for guidance only, but the seller's figures are final and binding under the sales contract.

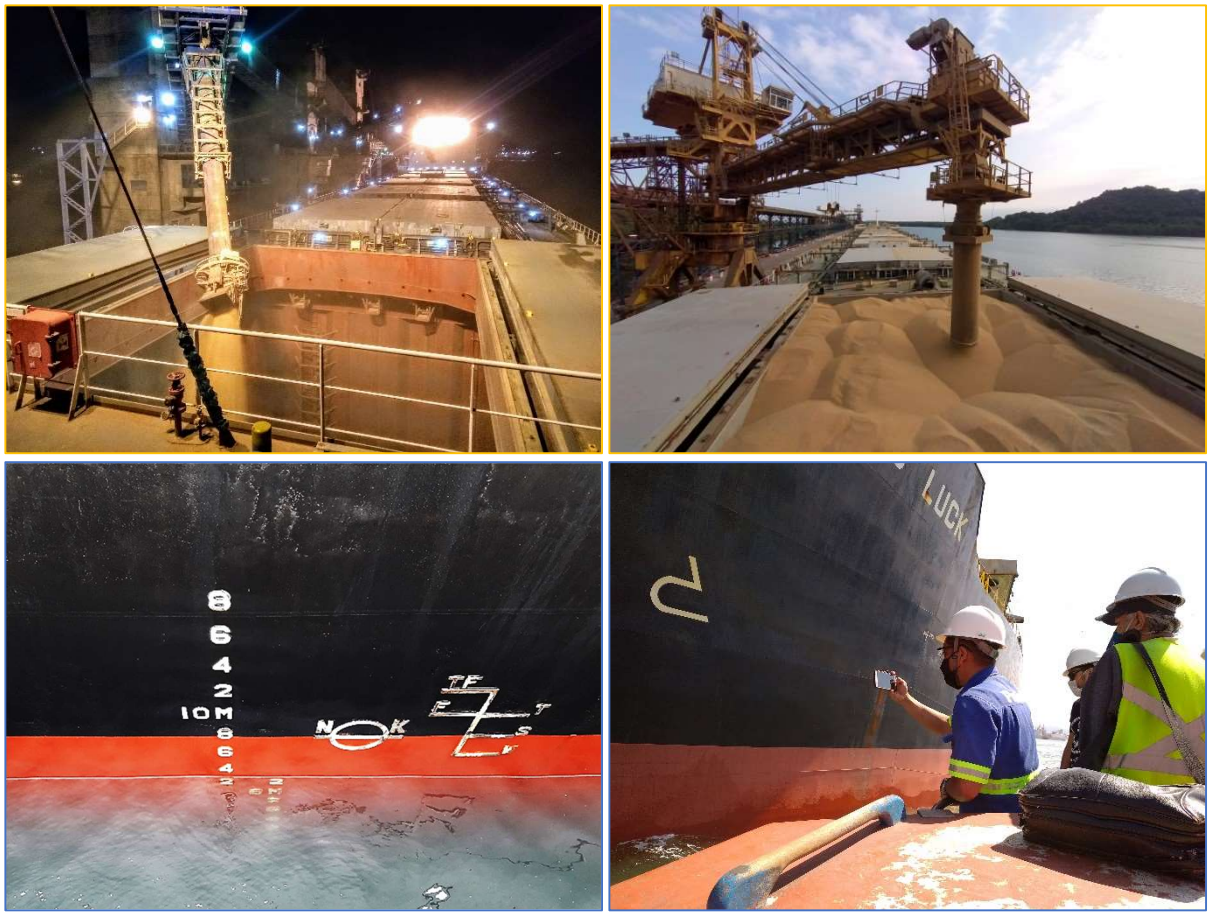
[42] *Instrução Normativa* - IN (Normative Instruction) N° 28 of 1994 (RFB IN 28/1994) regulates the customs clearance for export. IN 1,800 of 2018 (RFB IN 1,800/2018) regulates expert services for the identification and quantification of imports and exports

[43] Arts. 22 to 24 of RFB IN 1,800/2018

[44] Clause 9 of ANEC Soybeans Contracts 41/42

5.3. Shortage allowance

Whereas in some foreign jurisdictions there are recognised customary shortage (or trade) allowances, typically around 0.5% of the manifested quantity, no statutory or agreed tolerances for cargo short-loading (or short-landing) apply in Brazil. On the other hand, the Customs Regulation[45] provides for a one per cent 'natural shortage' allowance for cargo in bulk for which the carrier is exempt of tax liability[46].



Pictures 9 to 12: Cargo quantification by shore scale and draft survey. Source: Proinde

In lack of a civil statute on the matter, the law courts broadly accept, by analogy, the 1% customs allowance to discharge the carrier from liability for short delivery of bulk cargoes. **[Sections 7.3 & 8.3]**

[45] Federal Decree 6,759 of 2009, as amended, generally known as *Regulamento Aduaneiro* (known as 'Customs Regulation')

[46] Arts. 72, 238 and 251 of the Customs Regulation

6. Soya bean loading and stowage

6.1. Statutory requirements

6.1.1. for the vessel

Chapter VI of the SOLAS Convention[47] regulates cargo carriage by sea in general, while Part C addresses the transport of grain in particular. Although it is a solid bulk cargo by nature, the soya bean is not listed in the IMSBC Code[48]; instead, it is considered a grain cargo[49] and, as such, is specifically covered by the International Grain Code[50].

In addition to meeting the stability requirements and other stipulations of SOLAS/VI and the Grain Code[51], masters of bulk carriers carrying grain must also observe the safety practices for loading this type of vessel outlined in the BLU Code[52].

All foreign vessels operating in Brazilian waters must comply with the relevant standards issued by the maritime authority, Brazilian Navy's Directorate of Ports and Coasts (DPC)[53]. Otherwise, there are no local specific conditions for port handling and sea carriage of soya bean in bulk.

6.1.2. for the cargo

MAPA's Normative Instruction 15 of 2004 (IN 15/2004)[54] regulates the procedures for certifying the hygienic-sanitary conditions of soya beans for export. It holds the cargo owner accountable for ensuring that the product is free of toxicity, contamination, foreign matters, impurities, and insects above the limits and tolerances specified in the domestic legislation or the *Codex Alimentarius*[55].

6.2. Allocation of liabilities

6.2.1. shipper's liability

The shipper is legally responsible for providing the carrier with all necessary description of the cargo intended for carriage, sufficiently in advance of loading, and for making sure that all legal requirements and procedures according to the local legislation are fulfilled, particularly concerning the Customs and MAPA.

Under the Brazilian Civil Code, the shipper is liable for losses resulting from inaccurate or false information about the cargo shipped, provided that the carrier submits its claim within 120 days, under penalty of lapsing of right[56].

[47] Chapter VI of the International Convention on Safety of Life at Sea (SOLAS), 1974, as amended, by the International Maritime Organization (IMO)

[48] The International Maritime Solid Bulk Cargoes Code (IMSBC Code), 2008, as amended, by IMO

[49] As defined by SOLAS, the term “grain” includes wheat, maize (corn), oats, rye, barley, rice, pulses, seeds, and their processed forms whose behaviour resembles that of a grain in its natural state

[50] The International Code for the Safe Carriage of Grain in Bulk (International Grain Code), 1991, by IMO

[51] To be able to load grain cargoes, the Flag administration must issue the vessel with a “document of authorisation”, accompanied or incorporated into the vessel’s grain loading manual, as proof of compliance with the stability and stowage requirements of the Grain Code (Regulations 2, 7.2 & 9, Part C, Chapter VI of SOLAS; Section 3.1 of the Grain Code)

[52] The Code of Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code), 1997, as amended, by IMO

[53] Norms issued by the Brazilian Navy’s *Diretoria de Portos e Costas* – DPC (Directorate of Ports and Coasts), particularly NORMAM 04/DPC (Brazilian Maritime Authority Standards for the Operation of Foreign Vessels in Brazilian Jurisdictional Waters) and NORMAM 08/DPC (Brazilian Maritime Authority Standards for Traffic and Permanence of Vessels in Brazilian Jurisdictional Waters)

[54] MAPA *Instrução Normativa* - IN (Normative Instruction) N° 15 of 09/06/2004 (MAPA IN 15/2004) establishes the procedures to qualify and quantify the presence of particles with unknown toxicity, mouldy grains and dead insects or parts of these, impurities and/or foreign matter

[55] ANEC's soya bean contracts establish that seller must produce the phytosanitary certificate and the certificate of origin, among other documents, to the buyer (Clause 14 of ANEC Soybeans Contracts 41/42)

[56] Arts. 743 & 745 of the Civil Code (Law N° 10,406 of 2002)

6.2.2. carrier's liability

The vessel must satisfy all relevant requirements under SOLAS/VI, the Grain Code and the BLU Code. Before loading, the master must acquire from the cargo shipper and terminal all information necessary for calculating vessel's stability for proper stowage and safe transportation[57], as well as agreeing a documented loading plan with the port operator. **[Section 6.3.2]**

Under the terms of the special law (Law-Decree 116 of 1967)[58], carrier's liability begins when the cargo is received on board and subsists until delivery to the consignee at the port of destination, tackle to tackle, in line with the general provisions of the Brazilian Civil and Commercial Codes[59].

The master has an obligation to refuse to carry cargo visibly in poor condition or which may pose a hazard to human health or the safety of the vessel. He must also reject any shipment not accompanied by documents required by law or regulation[60]. Otherwise, the master remains liable for the safe cargo loading, stowage, conservation, and delivery to the rightful consignee[61].

6.2.3. Port operator's liability

The operator of the port terminal or facility[62] is legally liable for cargo shortage or damage from the moment it is taken in storage until the time it is loaded on the vessel[63].

Under the so-called Law of the Ports, the port operator answers to the cargo owner for loss or damage caused to the cargo during port operation or as a result of it. It must perform the cargo operation under the instructions of the master or his servants and remains liable to the shipowner for damage caused to the vessel or cargo[64].

6.3. Loading operation

6.3.1. Cargo information

Sufficiently prior to loading, the shipper must provide the master with written information on the intended shipment, including shipper's identity, full cargo description, destination, gross mass, maximum moisture content, and any other relevant cargo properties and characteristics. The cargo declaration must meet the requirements of SOLAS/VI and the applicable legislation[65].

[57] Regulation 2, Part A & 6, Part C, Chapter VI, of SOLAS; Section 2.2 of the BLU Code

[58] Law-Decree n° 116 of 1967 (as regulated by Decree 64,389 of 1969) regulates the operations related to the transport of goods by waterways in Brazilian ports establishing the responsibilities and dealing with cargo shortage and damage

[59] Art. 3 of Law-Decree 116/1967: "*The responsibility of the vessel or craft commences upon receipt of the goods on board and ceases with the delivery of the goods to the port entity or municipal wharf at the port of destination, alongside the vessel. § 1 the effective delivery on board is considered when the goods are handled by vessel's gear, from the commencement of the operation alongside the vessel.* (…) (free translation). Art. 750 of the Civil Code: "*The responsibility of the carrier, limited to the value appearing in the bill of lading, commences when it or its servants receive the thing and finishes when it is delivered to the consignee, or deposited in court if the consignee cannot be found"* (free translation). Art. 519 of the Commercial Code (Law N° 556 of 25/06/1850): *"The Captain is the true bailee of the cargo and any other effects that he receives on board and as such he has the duty of their custody, good stowage and conservation and their prompt delivery at sight of the bills of lading (articles 586 and 587). The liability of the Captain for the cargo commences from the moment he receives it and continues until he delivers it at the agreed place or the place which is in use at the port of discharge.*" (free translation)

[60] Art. 746 and 747 of the Civil Code

[61] Art. 519 of the Commercial Code; Section 4.1.1 of the BLU Code; Art. 27 of the Law of the Ports (Law n° 12,815 of 2013)

[62] Under the definition of the Law of the Ports, the port operator is "*the legal person pre-qualified to carry out the activities of handling passengers or handling and storing goods, destinated or coming from waterway transportation, within the area of the organised port*" (free translation). The port operator plays the role of terminal representative as defined in regulation 7, Part B, Chapter VI, of SOLAS

[63] Art. 2 of Law-Decree 116/1967: "*The responsibility of the port entity commences with the entry of the goods in its warehouses, yards or other places designated for storage and only ceases after effective delivery to the vessel or to the consignees. §1 the effective delivery to the vessel is considered from the commencement of loading operation alongside by way of vessel's gear.* (…) *§3 the goods delivered to the warehouse of the carrier or loaded or discharged to auxiliary ships owned by the carrier or acting on its behalf, are deemed delivered into the custody and responsibility of the carrier*." (free translation)

[64] Art. 26 of Law of the Ports (Law 12,815/2013)

[65] Arts. 743 to 745 of the Civil Code; Regulation 2, Part A, Chapter VI, of SOLAS

The Grain Code does not prescribe a specific format for cargo information. Some shippers and superintendent companies adopt the same form for solid bulk cargoes mandated under the IMSBC Code and appended to the BLU Code. Any form of cargo declaration may be acceptable provided it contains the essential information required.

Shipper's cargo declaration is a mere statement of the contractual quality specifications, most of which are not verifiable by the vessel's personnel at the time of loading or during the voyage. The master should, therefore, ensure that the cargo information is currently valid and derives from representative analysis of the lot to be shipped, particularly where it concerns the moisture content.

6.3.2. Loading and stowage plan

The BLU Code establishes procedures for information exchange between the vessel and the terminal (port operator) to start prior to vessel's arrival, so the loading programme can be timely and safely planned. It requires that the loading plan be formally agreed between the master (or the chief officer) and the terminal. The plan should include the loading rate and sequence, deballasting rate, cargo trimming and levelling procedures, and fumigation where required[66].

6.3.3. Loading supervision

Both the port operator and the master are responsible for ensuring that the loading operation is carried out according to the agreed stowage plan, including any mutually accepted variations[67].

The port operator is responsible for performing the cargo operation through its own stevedores or casual port workers it may hire from the unions.

The master remains ultimately responsible for the cargo safe loading and stowage. He (or his duty officer) must suspend loading if the permissible forces and moments on the vessel are exceeded, or if the stability is compromised, in which case the master and the port operator should agree on the corrective action to be taken. Likewise, the master has the right to halt the operation if the apparent cargo condition deviates from sound or in any way differs from the cargo declaration.

Pictures 13 & 14: soya beans being poured into the holds of bulk carriers in the early stage of loading. Source: Proinde

[66] Sections 3 & 4, and Appendices 3 & 4 of the BLU Code

[67] Regulation 7, Part B, Chapter VI, of SOLAS; Section 5 of the BLU Code

Picture 15 to 18: soya beans being poured into the holds of bulk carriers. Source: Proinde

6.3.4. Cargo trimming

When completely loaded, all cargo holds must be full and trimmed to ensure that the surface is level and any void spaces under the decks are filled to the maximum extent possible to minimise grain shifting effects. If the cargo holds are only partially filled, all free grain surfaces must be levelled following the procedures outlined in the Grain Code[68].

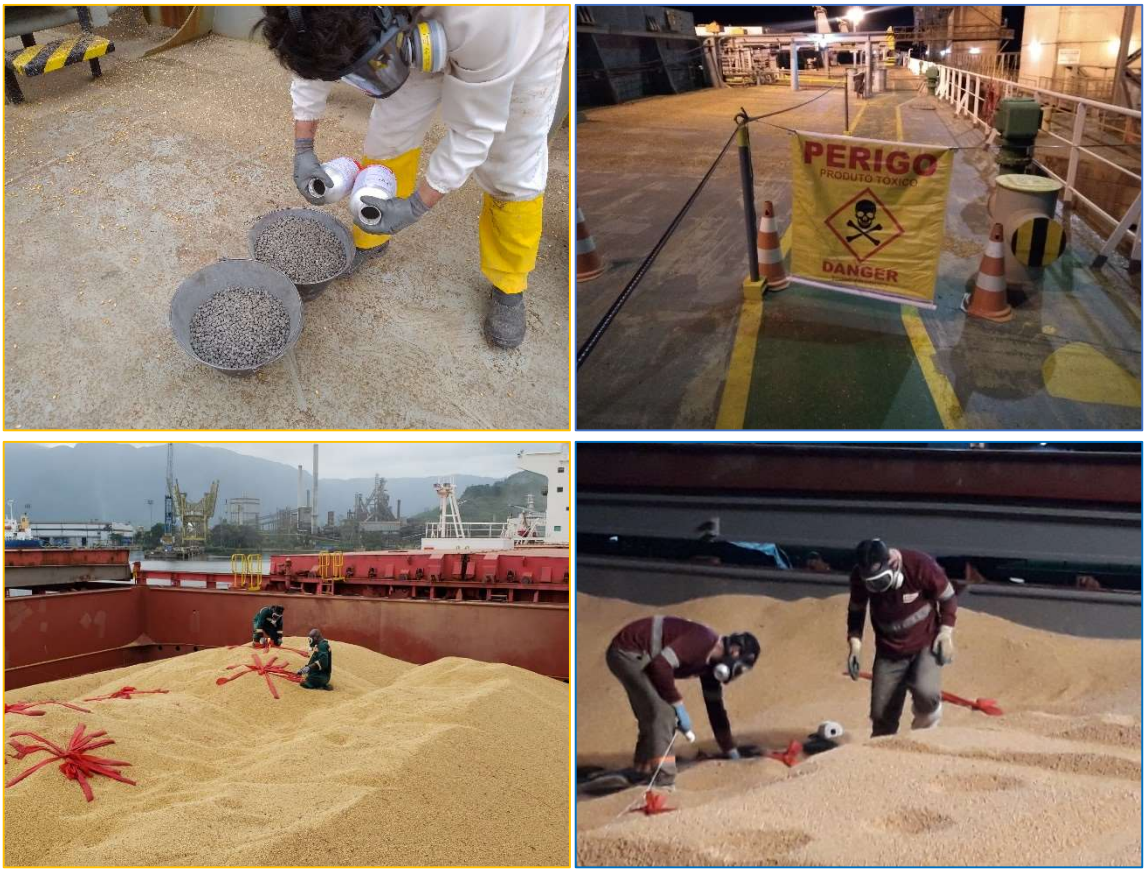
Pictures 19 & 20: soya bean after trimming. Source: Proinde

[68] Section 10 of the International Grain Code

6.3.5. Cargo fumigation

When required by the shipper, soya bean shipments are treated with phosphine-generating formulations in varying dosages, shapes and application methods. Phosphide tablets, sachets or sleeves are evenly spread on top of or within the cargo for in-transit fumigation, during which time cargo holds must remain gastight for a few days[69].

IMO provides detailed safety recommendations on the use of shipboard pesticides and fumigation of vessels and cargo holds[70]. In Brazil, MAPA regulates the use of fumigants and accreditation of companies to carry out shipboard quarantine and phytosanitary treatments in Brazil[71].



Pictures 21 to 24: soya bean fumigation. Source: Proinde

Under the relevant regulations, the "fumigator-in-charge" must provide sufficient documentation to the master to prove competence and permission as well as information on the type of fumigant, hazards to human health and safety precautions[72]. In transit fumigation of cargo spaces is usually arranged by the shipper, though it can only be performed at master's sole discretion[73].

[69] The length of the fumigation depends on the volume of cargo, fumigant concentration and method adopted. A typical application with aluminium phosphide comprises dosages of 1 g/m^3 of cargo with exposure time of up to 360 hours

[70] Regulation 4 Part A, Chapter VI, of SOLAS; "IMO Recommendations on the Safe Use of Pesticides in Ships Applicable to the Fumigation of Cargo Holds", IMO Circulars MSC.1/Circ.1264, May 2008, as amended, and "IMO Recommendations on the Safe Use of Pesticides in Ships", MSC.1/Circ.1358, June 2010

[71] MAPA Normative Instruction SDA n° 66 of 2006 (IN DAS 66/2006) regulates the use of pesticides in quarantine and phytosanitary treatments

[72] "Gard Loss Prevention Circular n° 13-11: Dangers to crew during in-transit fumigation of cargo"; "Gard Insight 204, 2011: Fumigation of cargo on board ships: the invisible killer", 2011, by Gard P&I. "Briefings: Cargo Fumigation", 2016, by the North of England P&I

[73] Section 3.3.2.1 of Annex to MSC.1/Circ.1264, as amended, by the IMO

7. Cargo risks

7.1. Inherent vice

As all agricultural cargoes, soya beans are perishable and have an inherent vice[74]. The oilseed contains a high oil content and its quality and storability directly depend on its moisture content (MC) and temperature at loading, which are the two key parameters to determine the period of safe storage and transport. Other factors, such as crop quality, levels of free fatty acid (FFA), post-harvest drying, handling and storage, as well as climatic conditions prevailing during haulage and loading at the port also contribute to the outturn quality of the commodity.

More than three-quarters of Brazilian soya bean exports are bound for Asia and arrive at destination generally in good condition. However, shipments that eventually deteriorate due to microbiologically-induced self-heating invariably result in costly cargo claims and expenses.

7.1.1. Moisture content and temperature

Due to its intrinsic nature, soya bean is prone to deteriorate and self-heat whenever its MC and temperature rise above the limits within which the oilseed is biologically stable. The overgrowth of fungi/mould and the consequent cargo overheating tend to be exacerbated during long-haul sea passages, mainly when the beans are carried from warmer to colder climates.

There are no statutory stipulations for soya bean temperature during storage or transport. ANEC standard contracts specify a maximum MC of 14%, in line with the recommendation of the Ministry of Agriculture (MAPA)[75], which is a limit perceived as too high by P&I clubs and cargo scientists.

Soya beans loaded with temperate between 25º C and 35° C and MC of up to 11.5% are regarded as stable and with low risk of overheating. However, beans loaded with temperature in the range of 25-35° C, and MC between 11.5% and 14% or higher are considered biologically unstable and likely to self-heat during sea carriage[76]. **[Table 9]**

Cargo temperature at loading	Average moisture content	Self-heating risk	
25°C or less	11.5% or less	Low risk	Stable
Between 25°C and 35°C	11.0% or less	Low risk	Stable
Between 25°C and 35°C	**11.5% to 14%**	**High risk**	**Unstable**
Between 25°C and 35°C	**14% or higher**	**High risk**	**Unstable**

Table 9: Soya bean temperature & MC and risk of self-heating. Source: Thomas' Stowage/North P&I

Although there are variations in quality and storability of individual types, soya beans with temperatures above 21°C are assumed to have a safe storage time between 45 days (with an MC up to 14%) and 125 days (MC up to 12%). The higher the MC and cargo temperature, the shorter the shelf life of the legume. MAPA recommends that soya bean are stored with a maximum MC of 13%[77]. **[Table 10]**

[74] The term "inherent vice" is defined (in Soya GmbH Mainz KG v White [1983] 1 Lloyd's Rep 122) as the "*natural behaviour* [of the goods] *in the ordinary course of the contemplated voyage without the intervention of any fortuitous external accident or casualty*"

[75] Clause 3.1 of ANEC 41/42; arts. 4, § 4 of MAPA IN 11/2007

[76] "Soya GmbH Mainz Kommanditgesellschaft v. White [1983]"; 1983, judgement by the House of Lords; "Gard Loss Prevention Circular: Prevention of soya bean cargo claims", 2013; "Gard Loss Prevention Circular: Heat damage in soya bean cargoes", 2016; "Thomas' Stowage - The Properties and Stowage of Cargoes, 8th Edition", 2018, by Brown Son & Ferguson

[77] MAPA IN 29/2011

Approximate storage time for soya beans

MC (%)	Cargo Temperature (°C)					
	- 1.11 (30°F)	4.44 (40°F)	10 (50°F)	15.56 (60°F)	21.11 (70°F)	26.67 (80°F)
	Approximate safe storage, in days (cumulative)					
11	*	*	*	*	200	140
12	*	*	*	240	125	70
13**	*	*	230	120	70	40
14***	*	280	130	75	45	20
15	*	200	90	50	30	15
16	*	140	70	35	20	10
17	*	90	50	25	14	7
19	190	60	30	15	8	3
21	130	40	15	10	6	2
23	90	35	12	8	5	2
25	70	30	10	7	4	2
27	60	25	5	5	3	1

*Allowable storage time exceeds 300 days. ** Maximum MC for storage recommended by MAPA. *** Maximum MC under ANEC standard contracts.

Table 10: Approximate allowable storage time for soya beans and MC limits. Source: North Dakota State University/MAPA/ANEC

The tendency is that the greater the air temperature, relative humidity and precipitation rate, the higher the soya bean MC uptake[78]. The propensity for the cargo temperature to approach the surrounding temperature and pick up moisture is more pronounced in the Amazon ports, where the weather is hot and humid almost all year. **[Table 11]**

	Local weather*					Soya bean biological stability**		
Port	Min. - mean - max. air temp. (monthly average, °C)			Precipitation (monthly/yearly average, mm)		Relative humidity (monthly average)	Moisture content (yearly average)	Temperature at loading (yearly average, °C)
Santos	19°	22.9°	25°	166	2,498	79.9 %	12.6 %	24.8°
Paranaguá	17°	21.5°	26°	167	2,284	81.6 %	12.4 %	23.2°
Rio Grande	16°	18.2°	22°	103	1,307	81.1 %	12.3 %	20.0°
Barcarena (Belém)	23°	26.5°	30°	182	3,084	86.8 %	13.0 %	28.5°
Itaqui (São Luís)	23°	26.7°	30°	192	2,200	84.9 %	12.9 %	28.2°
	▲ Highest / Driest					▼ Lowest / Wettest		

Table 11: comparison between MC and temperature and local weather at main grain ports. Source: *Climatempo/INMET **Proinde

7.1.2. Climatological factors

Given the hygroscopic nature of the soya bean, the climate and storage condition directly impact its MC and temperature, which levels will ultimately dictate how the commodity will behave microbiologically inside the cargo holds during a voyage.

Post-harvest history of the beans and, indeed, their biological performance while seaborne are beyond the control of the master. Nonetheless, it is crucial to monitor and keep a detailed record of the prevailing weather condition and cargo temperature throughout loading operation, not only to build up evidence of any damage resulting from vice of origin but also to allow the master taking an informed decision on the cargo ventilation strategy to be adopted. **[Section 8.2]**

Brazil is a continental country with a variable climate[79]. Since more than half of the grains are harvested in the fields of the Central-West, the distances travelled to the vessels can be rather long, with shipments going through different climatic conditions, often taking several days to reach the port terminal or barge station. For example, Sorriso fields in northern Mato Grosso are about 2,050 km away from Santos, that is around 27 hours' drive (non-stop). From Sorriso to Miritituba barge stations on the Tapajós River, the road journey takes 1,080 km (17 hours' drive), plus another 145 nm in barge convoys downstream to Santarém (about 16 hours of navigation)[80].

[78] Random surveys consisted of testing (with portable moisture meters during loading) soya beans from around 200 shipments in the main Brazilian ports between Jan/18 and Jul/20. This assessment was made for reference only and has no statistical or quantitative value

[79] Brazil has an area of over 8.5 million square kilometres, stretching 4,350 km from north to south and east to west. It encompasses different hydrographic basins, with climate ranging from tropical and subtropical to temperature in the far south of the country. Source: Encyclopædia Britannica [retrieved 01/10/20]

[80] "Brazil Soyabean Transportation, 2nd Quarter 2020, 2020, by the USDA [retrieved 15/10/20]

Each of Brazil's geographic regions has a peculiar climate, and some of them experience sharp climatic variations throughout the year. The tables below feature the main average temperatures and rain regimes of the various grain exporting ports[81].

North Region

Brazil's rainiest region, the Amazon is home to the riverside ports of **Itacoatiara**, **Santarém**, Vila do Conde (**Barcarena**) and **Santana** (Macapá). It comprises an immense geographical area of high temperature and humidity with intense rain regimes, mainly between December and May, a period known locally as the "Amazon Winter", when the precipitation index more than doubles, relieving the thermal sensation.


North Region

North Region

▲ Highest Driest / ▼ Lowest Wettest	Itacoatiara (Manaus)			Santarém			Barcarena			Santana (Macapá)		
	T Min. – Max. (°C)		P (mm)	T Min. – Max. (°C)		P (mm)	T Min. – Max. (°C)		P (mm)	T Min. – Max. (°C)		P (mm)
Jan	22°	30°	336	22°	31°	194	23°	29°	253	23°	30°	306
Feb	22°	31°	295	22°	30°	274	23°	28°	287	23°	29°	342
Mar	22°	30°	**348**	22°	30°	**383**	23°	28°	326	**23°**	29°	**408**
Apr	22°	30°	327	22°	30°	347	24°	28°	**360**	24°	30°	379
May	22°	31°	276	22°	30°	274	23°	28°	313	24°	30°	362
Jun	22°	31°	176	22°	31°	152	**22°**	29°	175	23°	30°	220
Jul	**22°**	31°	130	**21°**	31°	130	22°	30°	128	23°	31°	182
Aug	22°	32°	**83**	22°	32°	64	23°	31°	95	23°	32°	98
Sep	22°	32°	88	22°	32°	58	23°	32°	55	23°	32°	43
Oct	22°	**33°**	113	22°	**33°**	**54**	24°	**32°**	45	24°	**33°**	**32**
Nov	22°	33°	138	23°	33°	71	24°	32°	**31**	24°	32°	59
Dec	22°	31°	231	22°	32°	120	24°	31°	120	23°	31°	133
Average	**22°**	**31°**	**212**	**22°**	**31°**	**177**	**23°**	**30°**	**182**	**23°**	**31°**	**214**

Table 12: Average monthly temperature (T) and precipitation (P) in the ports of the North. Source: Climatempo/INPE

The average mean daily temperature in the North region is 27°C. The peak of rainfalls occurs in March and April, predominantly in the delta of the Amazon River, where Barcarena and Santana are located. The region experiences a period of drought between August and November, a time when the navigation of barge convoys on some stretches of the inland waterways is restricted or suspended due to shallow waters. **[Table 12]**

Northeast Region

Brazil's hottest – and driest – area, the Northeast is within the "drought quadrilateral" that extends from the state of Maranhão, in the far west of the region where the port of **Itaqui** (São Luis) is located, to Bahia, on the northeastern coast, home of the small-sized ports of **Aratu** and **Ilhéus**.


Northeast Region

São Luís records a daily mean temperature of 26ºC. Likewise most of the Northeast, the region suffers from a prolonged, sometimes harsh, dry season from August to around November, the driest and warmest month; however, the rainy season, from January to May, can be quite severe with cloudy weather and torrential rains, particularly in April.

Aratu near Salvador, and Ilhéus, further south, have a consistent average temperature of 24-25ºC with drier weather in December and January and heavier rainfalls between April and June. **[Table 13]**

[81] Data comprised of average readings for the given region for the last 30 years, identifying the most rainy/dry and hot/cold season in a region, provided by Climatempo and the National Institute for Space Research (INPE) [retrieved 01/10/20]

		Northeast Region									Southeast Region					
▲	Highest Driest	Itaqui (São Luis)			Aratu (Salvador)			Ilhéus			Tubarão (Vitória)			Santos		
▼	Lowest Wettest	T Min. – Max. (°C)		P (mm)	T Min. – Max. (°C)		P (mm)	T Min. – Max. (°C)		P (mm)	T Min. – Max. (°C)		P (mm)	T Min. – Max. (°C)		P (mm)
Jan		24°	30°	244	26°	28°	71	22°	29°	151	23°	31°	119	22°	29°	256
Feb		23°	29°	373	27°	28°	82	22°	29°	182	24°	32°	79	22°	29°	220
Mar		23°	29°	428	27°	29°	113	22°	29°	217	23°	31°	108	22°	28°	221
Apr		23°	30°	476	26°	28°	229	22°	29°	205	22°	29°	98	20°	26°	194
May		23°	30°	317	26°	27°	240	21°	28°	145	21°	28°	86	18°	25°	144
Jun		23°	30°	173	25°	26°	203	20°	26°	201	20°	27°	62	16°	23°	106
Jul		23°	30°	131	24°	25°	177	19°	26°	201	19°	26°	85	16°	23°	122
Aug		23°	31°	29	24°	25°	126	19°	26°	134	19°	27°	40	16°	23°	78
Sep		24°	31°	23	24°	26°	95	20°	26°	129	20°	27°	90	17°	22°	130
Oct		24°	31°	23	25°	27°	80	21°	28°	147	21°	27°	144	19°	24°	146
Nov		24°	31°	11	26°	27°	96	22°	28°	146	22°	28°	165	20°	26°	162
Dec		24°	31°	77	26°	28°	67	22°	29°	179	22°	30°	176	21°	27°	211
Average		23°	30°	192	25°	27°	132	21°	28°	170	21°	29°	104	19°	25°	166

Table 13: Monthly temperature (T) and precipitation (P) in the ports of the Northern & Southeast. Source: Climatempo/INPE

Southeast Region

Tubarão terminal, in Vitória, has an average temperature of around 25° C and the lowest precipitation records among Brazilian grain ports. **Santos**, on the coast of São Paulo, has a tropical climate with the average lowest and highest temperatures of 19° C and 25° C, and a mean temperature of 22º C. From November to March, temperatures are high; during the usually rainy summer, flash rain showers are frequent. **[Table 13]**

Southeast Region

South Region

The southernmost region of Brazil displays a subtropical to temperate climate. With warm to moderate temperatures in summer and cold and humid weather in winter. The port of **Rio Grande** lies in the coldest Brazilian state with relatively low precipitation rates. The average temperature is around 18°C, with January being the hottest month and July the coolest and wettest.

South Region

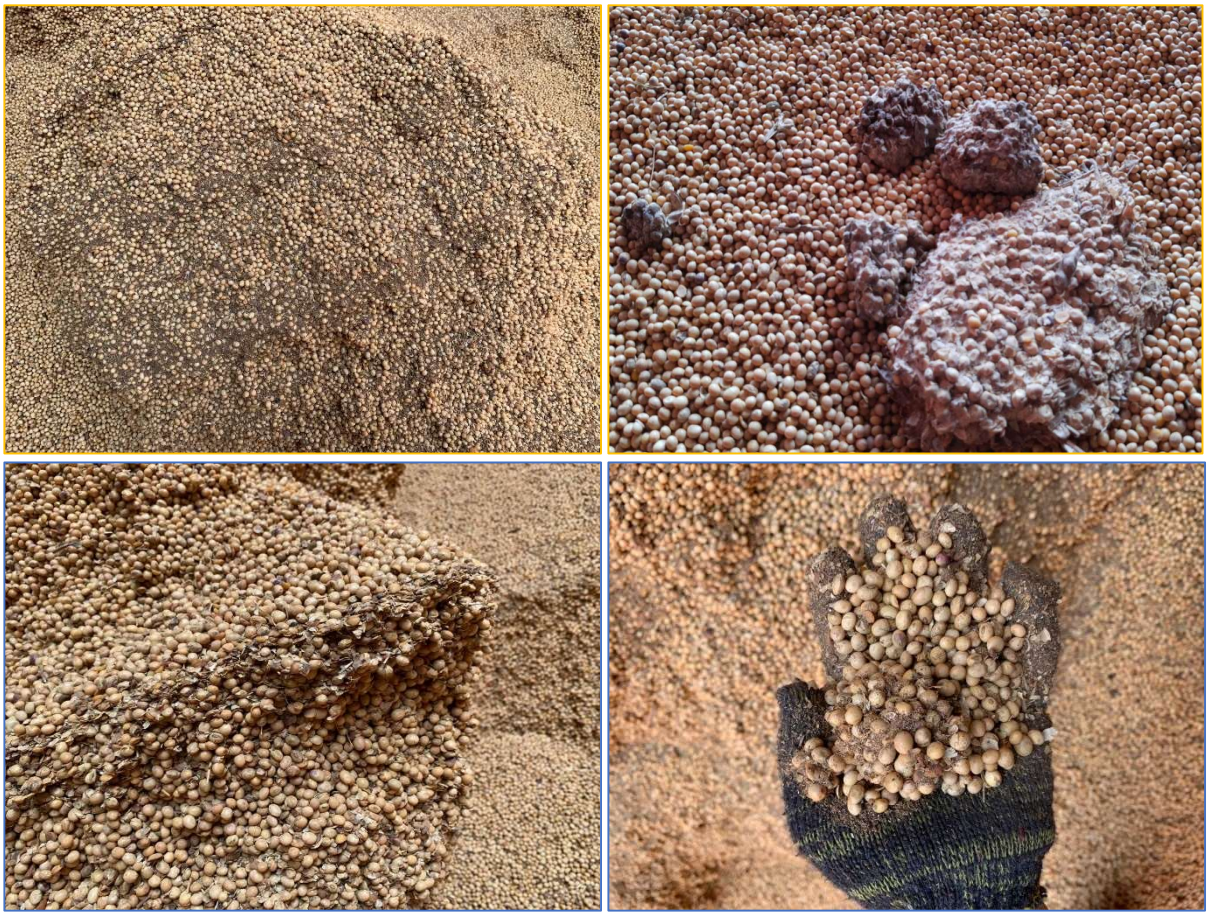
		South Region											
▲	Highest Driest	Paranaguá			S. F. do Sul			Imbituba			Rio Grande		
▼	Lowest Wettest	T Min. – Max. (°C)		P (mm)	T Min. – Max. (°C)		P (mm)	T Min. – Max. (°C)		P (mm)	T Min. – Max. (°C)		P (mm)
Jan		21°	30°	293	22°	28°	312	23°	30°	175	21°	27°	113
Feb		22°	30°	265	22°	28°	259	23°	29°	174	21°	27°	101
Mar		21°	29°	268	21°	28°	225	23°	29°	135	20°	26°	113
Apr		19°	27°	171	19°	25°	136	21°	30°	97	17°	23°	52
May		17°	25°	120	17°	23°	125	18°	30°	108	14°	20°	87
Jun		14°	23°	102	14°	21°	100	17°	30°	83	11°	17°	110
Jul		14°	22°	90	14°	21°	127	15°	30°	100	11°	16°	175
Aug		15°	23°	77	15°	21°	96	16°	31°	85	11°	17°	126
Sep		16°	23°	136	15°	21°	171	16°	31°	122	13°	18°	143
Oct		17°	25°	152	17°	23°	184	18°	31°	124	15°	21°	81
Nov		19°	27°	158	19°	25°	180	20°	31°	123	17°	23°	74
Dec		20°	28°	173	21°	27°	198	21°	31°	132	19°	26°	60
Average		17°	26°	167	18°	24°	176	19°	30°	121	16°	22°	103

Table 14: Monthly temperature (T) and precipitation (P) in the ports of the South. Source: Climatempo/INPE

The small port cities of **São Francisco do Sul** and **Imbituba**, in Santa Catarina, feature minimum and maximum temperatures of 18° C and 30° C with heavier rains in the summer. Paraná's grain powerhouse port of **Paranaguá** experiences a subtropical climate with hot and rainy weather from January to March and cold and relatively dry wintertime between May and August. **[Table 14]**

7.2. Cargo damage

The incidence of severe damage to soya beans during loading, to the point of requiring the removal of the cargo, is relatively low when compared to the growing number of vessels that load this commodity every day in Brazilian ports. Nevertheless, most grain terminals are designed to load cargoes and are rarely fitted with any cargo unloading equipment. Removing substantial volumes of spoiled cargo from inside the vessel's holds can be a challenging exercise, especially in distant ports such as those in the Amazon region, where facilities may not be readily available for off-loading the damaged cargo.



Pictures 25 to 28: soya beans mouldy, caked and overheated. Source: Proinde

7.2.1. Wetness

The most common cause of damage to soya bean cargoes during loading is rainwater, typically by way of sudden, torrential rains that catch the hatches wide open and enter through the hold opening, wetting the top layer of the stowed cargo. Rainwater (or washwater from cleaning of cargo conveying system) trapped on the conveyor belt is another common cause of damage. Wet or damp parcels should be promptly removed to prevent germination or excessive mould growth that may spread to the surrounding beans. **[Section 8.2]**

7.2.2. Contamination

In addition to foreign matter and residues and other parameters intrinsically related to soya bean grading[82], over which the vessel has no control or responsibility, common sources of contamination are residues of other bulk cargoes previously handled by the terminal whose cargo transport system was not adequately cleaned before loading operation.

[82] As defined by in art. 2, X, of MAPA IN 11/2007, foreign matter and impurities are "*all materials that leak through sieves with the following characteristics* (...)*, or that are retained by sieves, other than soya bean, including pods not threshed; the soya bean husk (skin) retained by sieves is not considered impurity*" (free translation)

Occasionally, extraneous objects, such as plastic linings, pieces of rubber and other debris, even rodents and pigeons, are loaded together with the cargo and obviously need to be removed.

7.2.3. mould and self-heating

As discussed above, cargo moisture content (MC) and temperature are critical factors that directly influence the microbiological stability of the soya beans and their safe storage and transport. Yet, although the temperature at loading can be roughly checked, the master or his crew cannot visually establish the MC of the cargo loaded and have no means of testing it on board. A bean containing 11% of water looks just the same as a bean with 14% or more to the naked eye. Mouldy and overheated beans are only visible when already in an advanced stage of deterioration (in the form of mouldy, bin-burnt and darkened beans) giving off a musty, sour, sometimes objectionable odour.

7.3. Cargo shortage

From the moment the cargo is poured into the holds, the master becomes its custodian. He must, therefore, take all necessary precautions and exercise due diligence, to deliver it to the consignee in the same condition as received, within a reasonable time or as contractually stipulated[83].

In case of short loading, the master must file a note of protest and request the shipper to load additional cargo to offset the shortfall. Where disputes arise, joint soundings and measurements tend to result in the shipper (or port operator) agreeing to bridge the gap between shore scale and draft survey. When no agreement is reached, the owner should involve the charterers in the discussions with the shipper, and the master should consider inserting a remark in the mate's receipt and bill of lading.

7.3.1. clausing of mate's receipts/bills of lading

Disagreements over whether the mate's receipts and bills of lading should be claused to reflect discrepancies in quantity are somewhat common in the bulk cargo trade. The conflict arises when, on the one hand, the shipper needs a clean bill of lading to satisfy the letter of credit and receive for the goods sold and already shipped, and, on the other hand, the master must exercise his duty to safeguard the interests of the carrier and, ultimately, the consignee.

Even though documentary requirements under ANEC's and other standard contracts call for "clean on board" bills of lading, the sales contract is not automatically binding on the sea carrier. There is no legal provision anywhere in Brazilian Law compelling the master to issue a clean receipt when he reasonably believes that the goods delivered to him are not, to the best of his experience and knowledge, in apparent good order and condition, or as described by the shipper.

Once the loading is completed, the master (or someone under his written authority) has 24 hours to sign and deliver the corresponding bill(s) of lading in exchange for the mate's receipt(s)[84]. If the bills of lading are not qualified, there will be a legal presumption that the cargo was delivered to the vessel in the same quantity, quality and condition described by the shipper in the shipping documents[85]. Therefore, whenever the master is in doubt or does not have reasonable means to verify the accuracy of shore figures, he is entitled to clause the mate's receipts and bills of lading.

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[83] Arts. 749 & 750 of the Civil Code; art. 519 of the Commercial Code

[84] Art. 578 of the Commercial Code: "*The bill of lading will be signed and delivered within 24 (twenty-four) hours, after the completion of cargo loading, in exchange of the mate's receipts, the master or the shipper who have been remiss in the delivery of the bill of lading being liable for all damages resulting from delay in the voyage.*"; art. 744 of the Civil Code: "*On receiving the thing, the carrier must issue a bill of lading setting out the information that identifies the thing, in accordance with provision of the relevant special legislation.* (…)" (free translation)

[85] Art. 4 of Law-Decree 116/1967: "*The goods will be delivered to the vessel or carrying ship against receipt issued by the carrier or its agent. § 1. Receipts must be passed in one of the non-negotiable copies of the bill of lading, which must contain space for notes on partial shipments and remarks concerning short-delivery and damage to cargo and its packaging. § 2. The delivery entity shall be responsible for shortage or damage verified at the time of shipment. § 3 - The damaged goods will be returned to the deliverer and will be subject to immediate inspection in the presence of the interested parties. It will only be re-loaded after the delimitation of the damage and clausing of the original bill of lading* (…)." (free translation)

The Commercial Code provides that, if the shipper disagrees with the remarks, the cargo should be recounted with the wrong party bearing the costs and expenses resulting from the recounting[86].

There are instances where, for commercial reasons, or fear of delays and ensuing expenses, which can easily overcome the amount of the cargo in dispute, the master eventually agrees to issue clean documents in exchange for a letter of indemnity (LOI) given by the shipper or charterers on the charter chain. This commercial arrangement, however, affords no legal protection to the carrier and may prejudice the vessel's P&I cover for cargo shortage liabilities.


Pictures 29 & 30: Soya beans being loaded with spouts. Source: Proinde

7.3.2. Shore x ship figures

There is no legal provision on the way of determining the weight of solid bulk cargoes. Customs authorities recognise and regulate at a local level, flow scales, weighbridges, flowmeters and draft surveys as acceptable methods of quantification. ANEC's standard contracts, in turn, require shore scale figures and, where one is not available, customs' draft survey figures. **[Section 8.3]**

[86] Art. 582 of the Commercial Code: "*If the goods have not been delivered by number, weight or measure, or if there is doubt in the count, the master may declare in the bill of lading that the same number, weight or measure is unknown to him; but if the shipper does not agree with this statement, a new counting should be done, at the expense of whoever caused it.*" (free translation)

8. Loss prevention issues

8.1. Cargo weather protection

8.1.1. Cargo holds

There are no specific requirements regarding cargo hold preparedness or cleanliness standards for loading of grain cargoes either under SOLAS or the Grain Code. ANEC contracts and MAPA regulations are not concerned with this issue. The commonly accepted industry standard is the "grain clean", the highest level of hold cleanliness, only second to "hospital clean"[87].

Grain clean standard requires cargo compartments to be empty, clean, dry, and free from:

- Previous cargo residues and transferable, rub off stains
- Loose rust scales, paint flakes and blisters
- Any contaminants or source of infestation or wetness
- Obnoxious odours (including that of uncured fresh paint)
- Moisture formation or leakage
- All holds' bilges must be empty, unobstructed, clean and dry

There may be other specific requirements by the charterer or shipper under the applicable contract.

Pictures 31 to 34: Cargo holds of bulk carriers before loading. Source: Proinde

[87] "Carefully to Carry: Safe Transportation of Soya Beans", 2017, by the UK P&I Club. "Thomas' Stowage - The Properties and Stowage of Cargoes, 8th Edition", 2018, by Brown Son & Ferguson. "Industry Expert - Cargo: Carriage of Soya Beans", 2019, by the Standard Club

8.1.2. Hatch covers

The hatch covers and closing appliances must be weathertight[88]. The integrity of the rubber packing and compression bars should be checked visually, and the weathertightness verified ideally by an ultrasonic leak test or, if it is not available, by hose test.

The preferred method for the ultrasonic tightness testing is that carried out according to equipment manufacturer's instruction or the International Association of Classification Societies (IACS) guidelines[89]. In most Brazilian ports, unless otherwise contractually stipulated, surveyors acting for the charterers and cargo interests would usually resort to hose test following the recommendations of the hatch cover manufacturer, vessel's class society or the IACS guidelines.

Once the vessel is alongside, surveyors appointed by the seller/shipper and or the buyer/consignee, usually accompanied by charterer's surveyor, will come on board. They will ask for vessel's particulars, and details of the last three cargoes carried – the dirtier (or dustier) the previous cargo, the more stringent the inspection tends to be. They will physically inspect the holds for "grain clean" standard and, in some cases, check the tightness of the hatches, usually with hose test.

Pictures 35 to 38: Hose test (above) and ultrasonic test of cargo hatches. Source: Proinde

In some cases, a preliminary cargo hold inspection is performed as soon as the vessel arrives at the anchorage area, for there to be sufficient time for rectification of potential deficiencies before the vessel proceeds to the loading berth. In these cases, a final, 'official' hold inspection is carried out when the vessel comes alongside.

[88] Under the definition of the IMO International Convention on Load Lines, 1966, as amended, "*'weathertight' means that in any sea conditions water will not penetrate into the ship*"

[89] IACS Rec 14 Hatch Cover Securing and Tightness, Rev.2 Corr.1, Oct 2005; IACS UR S14 Testing Procedures of Watertight Compartments - Rev.6 Sep 2016)

The duty officer must be aware of the time required to close the hatches of each of the holds in case of impending rain. He should also inquire with the terminal about the time necessary to retrieve the shore loading equipment from within the hold to close the hatch covers.

8.2. Cargo condition

The crew should visually inspect the cargo at the time of loading to make sure that the soya beans are apparently in good condition (not discoloured, darkened or bin-burnt). They should be aware of any uncharacteristic, aggressive odours given off by the cargo, and look for mouldy, caked or wet beans, the presence of foreign objects, contaminants, insects and rodents.

Meaningful, good-quality pictures illustrating the various stages of loading should also be taken and identified correctly for later reference, if necessary.

8.2.1. Cargo sampling

Taking representative samples from each of the holds can be useful as evidence to support pre-shipment or inherent vice defences against cargo claims. The ideal sampling point is directly from the holds since the carrier's liability legally commences when the cargo is loaded. When sampling from the cargo holds is unsafe, or not permitted by the terminal or the local port authority, the product should be sampled off the conveyor or vehicle at the nearest safe point to the vessel.

Picture 39 to 42: Soya beans samples being drawn from the hold concomitantly with the loading. Source: Proinde

MAPA has specific requirements for cargo sampling and grading, which are the same adopted by ANEC standard soya bean contracts[90]. **[See Chapter 4]**

[90] 500 g collections at regular intervals from conveyors, extracting at least 10-kg subsamples every 500 m/t transferred; homogenise, quarter, reduce to composite samples for analysis at every 5,000 t of the lot (summary of MAPA IN 11/2007)

For shipboard sampling, an alternative method is to draw samples uniformly and systematically throughout loading operation making up subsamples every 1,000 m/t of cargo loaded or every hour of operation, depending on the terminal throughput. The subsamples should ideally be tested with portable moisture meters, duly calibrated and certified, then homogenised and reduced to at least two sealed sets of composite samples of at least 1 kg each, per loaded hold.

Pictures 43 to 46: Soya beans samples collected from the holds before being tested, packed and sealed. Source: Proinde

A sampling certificate must be issued on completion of loading indicating the seal number of each of the samples. The surveyor should retain one set of cargo samples, and the other should be kept with the master until at least completion of discharge without claim notices. If there is a need to keep the samples for a longer period, the carrier must notify the attending surveyor in writing.

Pictures 47 & 48: Composite samples of soya beans packed, labelled and sealed (one sample per hold). Source: Proinde

8.2.2. Moisture and temperature monitoring

Leading P&I clubs reported that due to long voyages to China, where vessels often need to queue at anchorage for weeks before they can unload, overheating due to high moisture content (MC) and temperature is a major cause of deterioration of shipments arriving from Brazil. **[Section 7.1.1]**

The MC is an inherent vice to soya bean, something that the master cannot control or even perceive at the time of loading. The crew are not equipped or trained to draw samples or test the cargo, and they have other duties. The best they can do is to check the cargo condition during loading operation; the crew should also seek to obtain from the shipper or port operator the relevant "certificate of quality" (not to be confused with the "cargo declaration")[91] with the latest average MC results, though this information is rarely made available to the vessel.

Pictures 49 to 52: Soya beans being tested for temperature and moisture content concomitantly with the loading. Source: Proinde

The carrier should consider appointing qualified surveyors to monitor and record the loading (with continuous photographs), conduct MC and temperature tests and collect samples from each of the loaded holds at regular intervals[92]. This exercise will assist in the early detection of significant deviations that may influence cargo stability, hopefully in time to test the samples in an independent laboratory ashore (to double-check the results of the portable moisture meter). If the off-specification is confirmed by lab analysis, the interested parties should be notified about the problem. Probing the cargo temperature will also be useful for the master to adopt the "three-degree rule" for cargo ventilation during the passage. **[Section 8.4]**

[91] Written information on the intended shipment, including shipper's identity, destination, cargo description, gross mass, maximum moisture content (contractual parameter, not MC at shipment). The cargo declaration must meet the requirements of SOLAS/VI. See Section 6.3.1

[92] Ideally, a test to determine MC should be carried out every 1,000 m/t loaded or every hour of operation, depending on the terminal throughput. Under ANEC grading rule, which mirrors that of MAPA, analyses must be carried out every 5,000 m/t, which roughly means 12 tests performed in intervals of five hours, for a typical consignment of 60,000 m/t

8.3. Cargo quantity

Regardless of the weighing method adopted at each port of loading, the master has the right to resort to any alternative means to ensure the accuracy of shoreside measurements. He is entitled to challenge the shore figures whenever he detects substantial discrepancies.

The crew must be alert to cargo spillage from the cargo conveying system, or trucks and railcars alongside the vessel after the cargo has been weighed (by flow scales or weighbridges). Significant short shipments must be documented with a note of protest against the shipper and port operator, supported with photographs (and videos) evidencing the cargo wastage before loading.

Preventive measures, such as draft surveys and sealing of holds, may not, by themselves, preclude shortage claims under clean bills of lading. Yet, they might be useful to demonstrate master's genuine efforts to ascertain, as precisely as possible, the amount of cargo delivered to his custody, and that whatever the quantity loaded, it will remain unscathed inside the sealed holds, and will be discharged at the destination to the last bean.

8.3.1. Draft displacement survey

The chief mate or, preferably, an independent surveyor, should conduct light and loaded draft surveys in the presence of cargo interests and customs' surveyor if any. If loading on more than one berth, an intermediate draft survey should be conducted before the vessel leaves the first berth.

The result of the draft survey should be inserted in the statement of facts together with the shore and customs' surveyor figures. In the event of significant discrepancies, the master must lodge a formal protest and consider clausing the mate's receipts and bills of lading, in case the shipper or port operator fails to compensate for the shortfall. **[Section 7.3]**

Whether the master will be able to rely on the draft survey result to question the correctness of shore figures will depend on the accuracy of the measurements and calculations performed by his chief officer or a draft surveyor. It should be borne in mind that, however carefully carried out, a draft survey is not an exact method and depends on ideal sea conditions, with a degree of inaccuracy of more or less 0.5% being reasonably expected[93]. **[Section 5.3]**

8.3.2. Sealing of cargo holds

Combined with light and loaded draft survey, on completing of loading (and eventual fumigation), an independent surveyor should seal the hatch covers and associated manholes, unless the holds need to be opened during the voyage as part of an in-transit ventilation strategy or as directed by the fumigator-in-charge. Prior to discharge, an independent surveyor should be instructed to certify the integrity of the seals and break them in the presence of the duty officer and the surveyors acting for the cargo receiver and port operator.

Surveyors acting in the interests of the shipper or receiver should be invited to accompany the sealing or unsealing of the holds and countersign the relevant certificate as witnesses. It is advisable to make a note about the sealing (or unsealing) in the statement of facts and attach a copy of the respective certificate.

[93] "Insight 172: Draft surveys", 2003, by Gard P&I. "Ship v. Shore Figures", 2006, by the Steamship Mutual. "Draught Surveys: A Guide to Good Practice, 2nd Edition", 2009, by Jim Dibble, Peter Mitchell and the North P&I. "Loss Prevention Bulletin: Inaccuracies in Draught Surveys", 2018, by the West of England P&I [retrieved 15/10/20]

Pictures 53 & 54: Manhole and hatch covers closed on completion of loading of soya beans. Source: Proinde

8.4. Cargo ventilation

There are no mandatory requirements for ventilation of soya beans during sea carriage. ANEC standard contracts are also silent. Since the Grain Code requires cargo spaces to be filled to the maximum extent possible to minimise grain shifting, and most vessels leave Brazil laden to their full capacity, often there is little or no headspace left for effective surface ventilation[94].

Cargo ventilation during the voyage will not prevent mould development or cargo self-heating. Still, it can help minimise ship's sweat (condensation) falling on top of the stow, which would cause a generally bad impression about the overall cargo condition when the hatches are opened at the port of discharge. Therefore, ventilation port to port should be implemented, weather permitting; except where there is a restriction from the charterer, shipper or fumigator-in-charge.

When ventilation is possible (or required under a contract or fumigation procedure), P&I clubs advise masters to follow the "three-degree rule", whereby a cargo should be ventilated when the ambient temperature is at least three degrees Celsius below the cargo temperature recorded at loading. A less common method due to practical difficulties is the "dew point rule", consisting of ventilating the cargo whenever the outside dew point is lower than that of the cargo hold headspace[95].

Whatever is the ventilation strategy, the vessel must keep a clear and detailed record about the weather (relative humidity, dry and wet bulb temperatures, dew point for outside air, cargo temperature and dew point at loading and during the passage, probed at least twice a day. The ventilation log must include information on whether ventilation is needed, time for starting or suspending ventilation (and the reason thereof) in each hold, and bilge soundings. Impeding events, such as fumigation restrictions, bad weather or sea conditions, and formation of condensation should be noted down.

[94] "Bulk matters: a focus on some of the issues surrounding the carriage of bulk cargo in the P&I world", 2003, by the UK P&I Club

[95] "Gard Insight 173, 2004: Don't work up a sweat", 2004; "Gard Loss Prevention Circular: Prevention of soya bean cargo claims", 2013; "Gard Loss Prevention Circular: Heat damage in soya bean cargoes", 2016, by Gard P&I. "Carefully to Carry: Safe Transportation of Soya Beans", 2017, by the UK P&I Club. "P&I Loss Prevention Bulletin - Ventilation, Vol. 41", 2017, by the Japan P&I Club. "Carriage of Grain Cargoes", 2019, by the North of England P&I

9. Conclusion

In recent years, soya bean has been the driving force behind Brazil's thriving agribusiness, bringing significant positive economic and social impact in the regions that grow and move the versatile oilseed.

Unlike other trade sectors affected by the COVID-19 pandemic, demand for soya bean continues to grow. World production in 2020/21 is forecast to yield a bumper crop of almost 369 million tonnes, including record exports of 168 million tonnes, more than half of which shipped from Brazilian ports. The UN Food and Agriculture Organization (FAO) projects that global production will grow 1.3% per year throughout this decade, with Brazil continuing to be a major supplier to the international market.

By the third quarter of 2020, more than 100 million tonnes of soya beans had already been handled in Brazilian grain terminals, 78 million tonnes of which exported, a year-on-year increase of 27%. It means, on average, five bulk carriers leaving Brazil every day, four of them bound for Asia.

Although sea carriers are benefiting from the boom in soya bean exports, they should not let their guard down when it comes to preventing losses. Because of the risks involved and the significant claims that may arise, shipowners and charterers will never go wrong appointing experienced surveyors to check the cargo (appearance, moisture content and temperature) during loading and draw cargo samples to build up evidence of a possible cargo inherent vice. Draft surveys and sealing of holds on completion of loading are also useful measures to avert or minimise cargo shortage claims.

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