CIRCULAR 01.2026 – SOYA BEANS SHELF LIFE – NEW PERSPECTIVE

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After a quarter century of intense trading of soya beans between Brazilian ports and Far East, mainly China ports, it is now a common consent that **soya beans** are exposed to two different damages: **inherent vice** and **particular damage**.

The first damage, inherent vice, is caused by the nature of goods, and the second, particular damage, is caused by an accidental event, such as: infiltration of water in the hold(s) or ship's sweat during sea passage.

To understand the damage caused by the nature of goods, it is necessary to provide context on the production and expansion of soya beans in Brazil. Historically soya beans were produced in the south region of Brazil, border with Paraguay and Argentina, once the plant was adapted to favourable soil characteristic and weathering.

Considering the importance of vegetal protein in global market, Brazilian farmers commenced to expand plantation areas to north. This movement faces some difficulties because soil and weather properties changed from south to north (subtropical, tropical and equatorial).

Later, the expansion to new areas proved to be successful, mainly due to technical and scientific support of The Brazilian Agricultural Research Corporation – EMBRAPA, one of the largest agricultural research corporations in the world, with over half a century of contributions focused on innovation, efficiency, sustainability and social inclusion.

EMBRAPA recommends plantation of adapted seeds to all different agroclimatic zones, which results in good productivity and different physiology, such as protein, carbohydrates (fibre), lipids (oil) and moisture (water). Therefore, adapted seeds present different genetic traits and will present different response to environment.

Soya beans have a much shorter shelf life than other grains and tend to deteriorate. The combination of high moisture content, temperature, and dormant mould spores in the grains will play a significant role in the damages caused by nature of goods which cannot be avoided during contract of carriage, once it is an evolutionary process which commences on the harvest, passing through inland transport and storage.

Soya beans coexist with dormant mould spores (storage *fungi*) that can begin to grow and subsequently deteriorate the cargo under certain environmental conditions. It is well known that combination of low grain moisture content and low temperature inhibit the growth of fungal pathogens, increasing the grains shelf-life.

Each fungus has a lower limit of moisture content to grow (stable level): *Aspergillus restrictus* is 12.5% and *A. glaucus (Eurotium)* is 13.5%.

Brazilian Cargo Sale Contract establish 14% of maximum moisture content; and the parties involved in the trading are considering a reduction to 13%.

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Nevertheless, reducing the grain moisture content until stable level (below 12.5%) could be detrimental, because dried beans could break / split during harvesting, and/or handling until stowed on board of vessels, exposing the internal parts of the grain to oxidising process, reducing the grain shelf-life as well.

Increasing grain shelf life requires an understanding of the fungus, and the implementation of fungicide treatments to inhibit their development.

Soya beans in sound condition are selected as seed to the next harvest and are treated with fungicide to protect the grains against fungus. However, grains treated with fungicide contain toxicity and cannot be exported for human or animal consumption.

However, there is promising research aimed at extending soya beans shelf-life. Scientists of UFRJ – Federal University of Rio de Janeiro and EMBRAPA - The Brazilian Agricultural Research Corporation discovered the benefits of a native Brazilian Amazon palm, named Tucuma (*Astrocaryum vulgare* Mat.) as an antifungal / biopesticide potential against pathogens.

Initial results ascertained that tucuma antifungal reduces citrus postharvest phytopathogens in a high level. Roughly, tucuma will attack the fungus' membrane, inhibiting development.

Now, research is being expanded to agribusiness products, such as soya and maize, with emphases in industrial application. Authors of this research predict an industrial use of antifungal in a period of five years. The paper was published in the American Chemical Society and is accessible in the following link:

https://pubs.acs.org/doi/10.1021/acsfoodscitech.4c00563

For the time being the following is recommendable to be observe during loading operation:

1) Homogeneity of cargo: colour, smell and general appearance.

2) Presence of **impurities** could be detrimental for natural movement of air on interstitial space between beans.

   NOTE: Impurities are formed by small particles, and are different from **"sproutlines"**, formed by large and lighter materials, quite common observed present in the surface of cargo.

3) Presence of **sclerotia**, a resistant structure to fungal pathogen: *Sclerotinia sclerotiorum* (named White Mold).

Figura 27. *Sclerotinia sclerotiorum:* escleródios misturados com as sementes de soja.

4) Presence of ***Cercospora kikuchii*** (so-called purple mottled or stained)

NOTE: Both anomalies are not detrimental to the beans and are not considered a defect by the rules of Brazilian Ministry of Agriculture; however, the anomalies are associated with excessive moisture and high temperature during vegetative cycle of the plant; then, it is recommendable to collect samples to ascertain the moisture content.

In conclusion, it remains necessary to await further results in the research. Even so, the early results are encouraging and point to a promising possibility for future industrial application, with the potential to improve soya beans shelf-life and reduce inherent vice related losses over time.

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