REVTECH A NATURAL ALTERNATIVE TO CHEMICAL TREATMENTS FOR SESAME SEEDS

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Sesame seeds, from the Sesamum indicum plant and member of the Pedaliaceae family, are among the oldest oilseed crops known to mankind. They were first discovered in ancient sites in Pakistan and have been used for thousands of years for their nutritional properties and their many culinary and medicinal applications. They are rich in protein and lipids and could act as antioxidant, on cholesterol reduction and cardiovascular system protection (1). Sesame comes in white, black, and yellow varieties. Black sesame is more aromatic, while white sesame contains higher fat content. Sesame seeds are covered by an outer layer called the hull. Unhulled sesame seeds have a deeper color, while hulled sesame seeds have a milder, less nutty flavor.

THE MARKET

Asia-Pacific countries dominate the market, primarily due to major producers and exporters like China, India, and Myanmar, which are among the world's largest sesame seed producers. African countries like Tanzania, Ethiopia and Nigeria are also significant producers of sesame. The rich agricultural heritage of these regions, combined with favorable climatic conditions, enables high-yield production.
The sesame seed market size was estimated at $7.67 billion in 2024 and is expected to reach $8.72 billion by the end of 2030, with growth of 2.60% forecast for the period of 2024-2030 (2).

BENEFITS

The growing demand for sesame seeds as a functional ingredient in many foods, due to their many benefits, is driving the market. Indeed, these seeds are flooded with virtues. Sesame seeds are rich in fat, protein, minerals, vitamins and fiber. The fat content ranges from 45% to 57% (1) earning it the title of 'Queen of Oil'. They provide essential vitamins for healthy body functions, such as vitamin B1 (transforms carbohydrates into energy in the body), vitamin B2 (involves in the biological process of metabolizing proteins and fats), vitamin B3 (reduces blood cholesterol levels), vitamin B6 (improves memory capacity) and vitamin E (protects cell membranes and helps maintain a healthy immune system). Whole sesame seeds are a rich source of minerals and trace elements including iron, calcium, magnesium, zinc, and phosphorus. Their high fiber content provides digestive health benefits. Additionally, sesame seeds contain sesamin and sesamolin, excellent source of antioxidants contributing to the prevention of chronic diseases like cardiovascular disease and certain cancers. However sesame contains antinutrients such as oxalic acid and phytic acid. Various processing methods can help mitigate their effects.

ETO SCANDAL

Ethylene oxide (ETO) is a chemical primarily used as intermediate in the production of various chemicals such as dispersants, lubricants and surfactants. It is also used as a pesticide and fumigation agent in some countries to control microbial contaminants like Salmonella, E. coli, yeast, mold, coliforms and other pathogens. Once in contact with food, ETO undergoes various reactions producing molecules such as 2-chloroethanol (2-CE). Both ETO and 2-CE are considered carcinogenic, mutagenic and reprotoxic, and have been banned in food since 1991 in the European Union. In September 2020, Belgium raised an alert regarding high levels of ETO in sesame seeds imported from India. In Europe, sesame seeds can only be marketed if they comply with the Maximum Residue Limit (MRL) of 0.05 mg/kg. The limits for ETO vary depending on the product, ranging from 0.01 to 0.1 mg/kg (sum of ETO and 2-CE) (4). The 0.05 mg/kg limit led to numerous product withdrawals and recalls, affecting various processed foodstuffs containing the contaminated seeds such as cereals, chocolate, biscuits, bread, crackers, sesame oil and bagels. In the following months, high levels of ETO were also found in dehydrated shallots, psyllium, amaranth and turmeric, highlighting a real public health concern. In the US, the limits are set at 7mg/kg for ETO and 940 mg/kg for 2-CE (4). However, the FDA (Food and Drug Administration) is starting to question the use of this gas and is encouraging manufacturers to explore alternative solutions.

USES

Sesame seeds are highly versatile and can be used in various ways. They can be consumed hulled or unhulled (3) as raw ingredient in cooking: sprinkled on salads or Asian dished, mixed into breads, cookies, crackers, added to breadcrumbs ... They can also undergo further processing. They can be roasted or toasted to enhance their nutty and intense flavor. They can be pressed to extract the oil and the remaining paste, known as sesame meal, can be ground into a powder. Alternatively, the seeds can be pressed and ground whole to make sesame paste. The most common paste is called tahini and is used in Middle Eastern dishes. Sesame seeds are also recognized for their diverse non-culinary applications, including use in animal feed, fertilizer, fuel, cosmetics, and medicines.

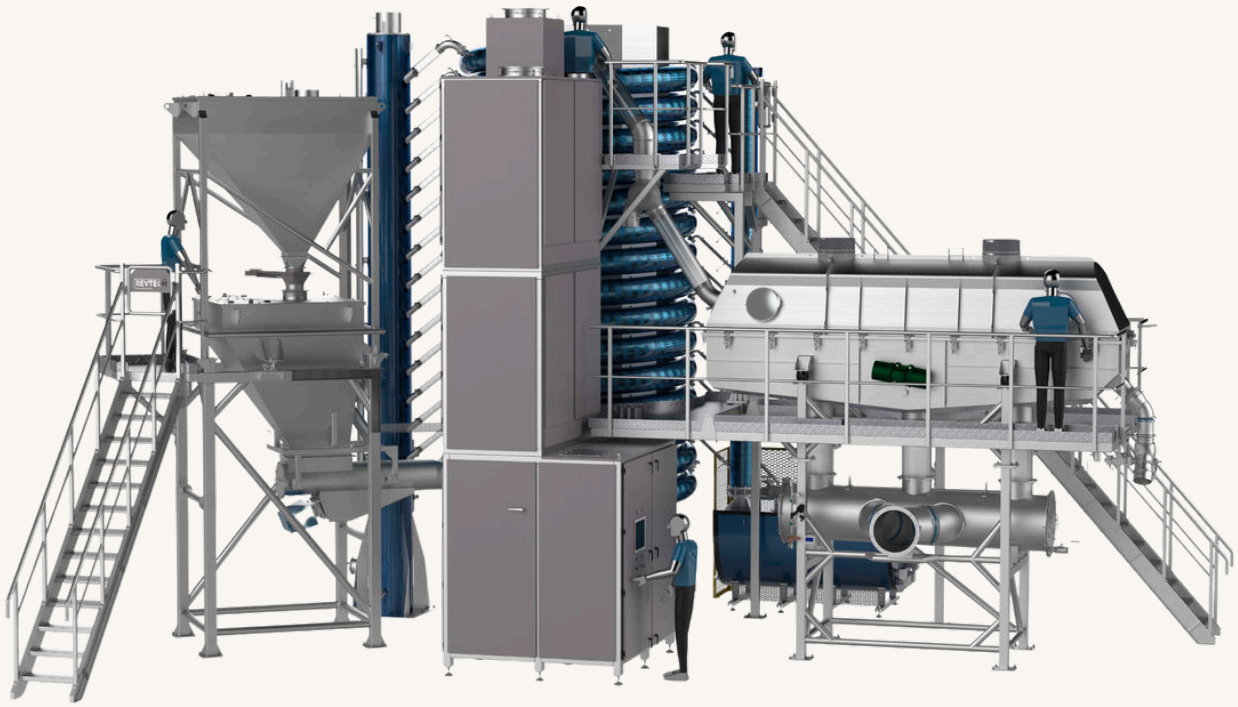
REVTECH NATURAL ALTERNATIVE

Revtech's core technology features a smooth, continuous stainless-steel tube coiled around a central vibratory support structure. Shaker motors at the bottom of the tower generate vibrations. The product enters the spiral at a constant flowrate and moves through the tube under the influence of these vibrations, being heated up by direct contact with the hot tube. Saturated steam, hot air or gases can be injected into the spirals. A filling ratio of around 25-30% enhances blending and ensures the uniformity of the treatment. The product is then cooled by contact with cold, dried, and filtered air, making it ready for packing or further processing.

This technology enables the continuous pasteurization of sesame seeds using only heat and a small amount of steam, typically between 2 to 3%. The treatment is natural and free of chemicals like ETO. It can be applied to both conventional and organic seeds, as well as unhulled and hulled sesame, regardless of their initial moisture levels. It significantly reduces the total plate count, is validated for a 5-log kill step against Salmonella and E. coli and ensures yeast and mold levels are below 10 UFC/g. The same system can be used for a light roast of sesame seeds by increasing the tube temperature and/or extending the residence time in the spiral after the pasteurization step. Additionally, it can operate at much higher temperature (up to 280°C) and longer residence times for a very dark roast (see below).

RAW | **220°C - 10 min** | **240°C - 10 min** | **250°C - 10 min** | **260°C - 10 min**

The system is fully automated, with parameters easily adjustable via a touchscreen to accommodate different starting products and applications. The units are custom-made, with flow rates ranging from 100 kg/h p to several metric tons per hour. Revtech's system not only offers superior pasteurization but also optimizes energy consumption, making it a cost-effective solution in the long run.



REVTECH REFERENCES

The first system designed for processing sesame seeds was installed in 2001 in the South of France to toast the seeds before pressing the oil out. This system is still in operation today. A few years later, in 2009, one of the leading companies in the Greek sesame market installed a Revtech system to pasteurize the seeds before roasting. They were so impressed with the results that they purchased a second system a few years later. Ten years ago, another leading company in the Netherlands purchased a large system (1.5 MT/h) to both pasteurize and roast the seeds simultaneously. Since then, Revtech has firmly established itself as a global leader in the sesame market, with major installations across North America and Asia. All of our clients saw a significant reduction in microbial contamination after adopting Revtech's pasteurization technology, resulting in higher product quality and increased customer satisfaction.

CONCLUSION

As global demand for high-quality sesame seeds increases, ensuring product safety and quality is more critical than ever. Revtech's technology meets these demands by offering an efficient, chemical-free solution that enhances both safety and flavor. Interested in learning more? Schedule a demo with our team to see firsthand how Revtech can improve your sesame seed processing. Reach out today!

SOURCES

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