

Gourmet Salts and Molecular Gastronomy

Hüdayi ERCOŞKUN

Çankırı Karatekin University, Engineering Faculty,
Food Engineering Department
hercoskun@karatekin.edu.tr
ORCID: 0000-0002-1788-8400

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Abstract

Salt has been an essential component of gastronomy for millennia, serving key roles such as seasoning, preservation, and altering food structures. It is crucial for both amateur and professional chefs to understand salt's multifaceted impact on cooking. Salt enhances flavor balance and aroma, preserves food by reducing water activity and providing antimicrobial effects, and triggers chemical changes like protein denaturation and gelling. Gourmet salts, such as sea, rock, flake, and infused varieties, offer unique textures, colors, and flavors that elevate dishes beyond what refined table salt can achieve. These specialty salts, often sourced from various regions, are prized for their distinctive mineral compositions and the unique flavors they impart. Finishing salts, in particular, play a special role in enhancing flavor, adding texture, and improving presentation. While gourmet salts provide these culinary benefits, their sodium content requires careful use, especially for those with health concerns. This article emphasizes the indispensable role of salt in gastronomy, its capacity to transform dishes, and the importance of a balanced and informed approach to its use. By understanding the unique characteristics of different salts, chefs can enhance both the taste and visual appeal of their creations.

Keywords: *Gourmet salt, finishing salt, natural salt*

Gurme Tuzları ve Moleküler Gastronomi

Öz

Tuz, binlerce yıldır gastronominin temel bir bileşeni olarak hizmet vermekte ve lezzetlendirme, koruma ve gıda yapılarının değiştirilmesi gibi önemli roller üstlenmektedir. Hem amatör hem de profesyonel şefler için tuzun mutfaktaki çok yönlü etkilerini anlamak büyük önem taşımaktadır. Tuz, tat dengesini ve aromayı artırmakta, su aktivitesini azaltarak ve antimikrobiyal etkiler sağlayarak gıdaları korumakta ve protein denatürasyonu ve jelleşme gibi kimyasal değişimlere neden olmaktadır. Deniz tuzu, kaya tuzu, yaprak tuz ve aromalı çeşitler gibi gurme tuzlar, rafine sofraya tuzunun ötesinde, benzersiz dokular, renkler ve tatlar sunarak yemekleri yükseltmektedir. Genellikle çeşitli bölgelerden elde edilen bu özel tuzlar, kendilerine özgü mineral bileşimleri ve katalitik özellikleri nedeniyle değer görmektedir. Özellikle bitirme tuzları, lezzeti artırmada, doku eklemeye ve sunumu iyileştirmede özel bir rol oynamaktadır. Gurme tuzlar bu mutfak faydalarını sağlarken, sağlık sorunları olan kişiler için sodyum içerikleri dikkatli kullanılmalı gerektirir. Bu makale, tuzun gastronomideki vazgeçilmez rolünü, yemekleri dönüştürme kapasitesini ve dengeli ve bilinçli bir kullanım yaklaşımının önemini vurgulamaktadır. Farklı tuzların benzersiz özelliklerini anlayarak, şefler hem lezzeti hem de görsel çekiciliği artırabilirler.

Anahtar kelimeler: Gurme tuzu, bitirme tuzu, doğal tuz

Giriş

Molecular gastronomy is a scientific approach to cooking, exploring the chemical and physical transformations that occur during culinary processes. Pioneered by scientists like Hervé This and Nicholas Kurti, molecular gastronomy challenges traditional cooking by employing techniques such as spherification, foaming, and the use of liquid nitrogen to create new textures and flavors. Gourmet salts play a significant role in this innovative culinary field, offering unique textures, colors, and mineral profiles. For instance, fleur de sel, hand-harvested from the salt marshes of France, is prized for its delicate crystals and mineral-rich taste. Himalayan pink salt, known for its distinctive pink hue, is mined from ancient sea deposits in Pakistan and contains trace minerals like magnesium and calcium, which contribute to its subtle flavor (This, 2006).

In contrast, table salt is a highly refined product, composed almost entirely of sodium chloride. It

often contains additives like anti-caking agents and is sometimes fortified with iodine to prevent deficiency disorders, such as goiter (World Health Organization, 2007). While table salt is essential in daily cooking for its consistency and iodine fortification, it lacks the nuanced flavors and textural qualities found in gourmet salts, making the latter a preferred choice in molecular gastronomy.

Salt has been significant as a commodity, currency, and preservative, influencing economies, politics, and cultures across different societies and time periods. Salt production and trade have shaped empires, led explorations, and triggered wars. Salt has even influenced beliefs and religions. Salt is a ubiquitous seasoning agent found on dining tables globally. Its presence extends to nearly all food items, serving both as a natural component and an additive for various purposes. It is a fundamental component in food due to its natural occurrence in various foodstuffs and its widespread use as an additive. When we consider salt gastronomically, we

encounter a wide variety of salts with different characteristics. Essentially, in gastronomy, there are table salt, gourmet salts, and finishing salts, although there are few studies on gourmet finishing salts. The negative effects of excessive salt consumption on human health have overshadowed the niche properties of salt (Di Salvo et al., 2023; Eyuboğlu, 2019; Fayet-Moore et al., 2020; Laszlo, 2001).

Salt is a fundamental ingredient in gastronomy, used in cooking for thousands of years. It serves multiple functions, including seasoning, preservation, and even altering the chemical structure of foods. Understanding the role of salt and its various types in the culinary world is crucial for both amateur and professional chefs (Drake & Drake 2011; Saruhan, 2021).

The aim of this article is to explore the diverse roles of salt in gastronomy, particularly focusing on the unique properties and culinary applications of gourmet and finishing salts. The article seeks to provide a comprehensive understanding of how these salts enhance flavor, texture, and presentation in cooking, while also addressing the importance of informed usage considering health implications. Through a detailed examination of the origins, processing methods, and sensory attributes of various salts, the article aims to highlight their significance in both traditional and modern culinary practices.

Functions of Salt in Gastronomy

Salt plays a multifaceted role in gastronomy, serving various functions that significantly impact the flavor, texture, and preservation of food.

One of the primary functions of salt in cooking is its ability to balance flavors. Salt enhances the overall taste of dishes by harmonizing bitter, sweet, sour, and umami elements. It works by suppressing bitterness and enhancing sweetness, which can improve the overall flavor pro-

file of a dish. This balancing act is crucial in both culinary and baking contexts, where precision in taste is essential (McGee, 2004). Salt is integral in flavor enhancement, as it intensifies and amplifies the natural flavors of foods, contributing to a more balanced and enjoyable taste experience.

Another significant function of salt is its role in food preservation. Historically, salt has been used as a method of preserving meat, fish, and vegetables due to its antimicrobial properties. Salt works by reducing the water activity in foods, thereby inhibiting the growth of microorganisms that cause spoilage. This method of preservation has been utilized for centuries and remains a key technique in modern food processing (Smith, 2002). The reduction of water activity not only helps in extending the shelf life of food products but also maintains their safety and quality over time.

In addition to its preservative qualities, salt induces chemical and physical changes in foods. One notable effect is protein denaturation, where salt alters the structure of proteins, making meats more tender. This property is particularly beneficial in brining and marinating processes, where salt enhances the texture and juiciness of meats. Salt's role in gelling and coagulation is also important, as it is used in cheese-making and various gelling processes, contributing to the texture and consistency of the final product (Gould, 1996).

Salt also plays a critical role in fermentation processes, particularly in lactic acid fermentation. In foods like pickles and sauerkraut, salt regulates the fermentation process by creating an environment conducive to beneficial bacteria while inhibiting the growth of undesirable microorganisms. This controlled fermentation process is essential for developing the distinctive flavors and textures of these fermented foods (Liu et al., 2016).

Overall, salt's diverse functions in gastronomy highlight its importance in enhancing flavors, preserving food, and facilitating chemical and physical transformations. Understanding these roles can help both amateur and professional chefs make informed decisions about how to use salt effectively in their culinary practices.

The Rise of Natural Salts

On social media and internet videos, there are numerous recommendations advocating for the consumption of gourmet and natural salts. These sources frequently claim that natural salts are essential mineral sources (McGee, 2004). Conversely, it is alleged that the beneficial minerals in refined salts are lost during the refining process (Smith, 2002). Additionally, it is suggested that refined salts should be avoided due to the presence of ferrocyanide additives, which are mistakenly believed to be carcinogenic (Gould, 1996). This bombardment of misinformation can lead consumers to prefer natural salts in the absence of accurate information (Ercoşkun, 2021).

First and foremost, no salt serves as a significant source of minerals, as the quantities of these minerals are at ppm (parts per million) and ppb (parts per billion) levels (McGee, 2004). Furthermore, the absorption of these minerals in their inorganic form is limited (Smith, 2002). In natural salts, heavy metals that pose food safety risks are not removed (Liu et al., 2016). In contrast, the refining process of salt eliminates harmful compounds, ensuring a safer product (Gould, 1996). Natural salts, however, retain these potentially toxic materials (Liu et al., 2016).

The World Health Organization (WHO) and the Food and Agriculture Organization (FAO) Joint Expert Committee on Food Additives (JECFA) determine the additives that can be used in foods through a rigorous process that includes toxicological tests (WHO & FAO, 2021). The use

of ferrocyanides in specified amounts is deemed safe and not harmful (WHO & FAO, 2021).

In summary, the preference for natural salts over refined salts arises from misinformation (Smith, 2002). Natural salts do not contain significant amounts of minerals, and the refining process of salts ensures the removal of potentially harmful substances (McGee, 2004). The additives used in refined salts are meticulously regulated and considered safe by international health organizations (WHO & FAO, 2021).

Iodine added to table salts is crucial for combating iodine deficiency and goiter, which are common health issues (Gould, 1996). However, due to misinformation, consumers may reduce their iodine intake by opting for natural salts that do not contain iodine (McGee, 2004). Therefore, it is essential to exercise caution when consuming natural salts to ensure adequate iodine intake (Smith, 2002).

Gourmet Salts vs. Finishing Salts

Gourmet salt, also known as artisanal or specialty salt, encompasses a wide range of high-quality salts with unique textures, colors, and flavors. Unlike refined table salts, gourmet salts offer unexpected sensory attributes, including taste, aroma, flavor, and appearance. This review explores the origins, processing methods, and culinary significance of gourmet salt, highlighting its growing popularity in haute cuisine and home cooking (Almeida et al., 2019; Deniz and Kadioglu, 2023; Soylak et al., 2008).

Gourmet salt comes in various forms, including sea salt, rock salt, flake salt, and flavored or infused salt. Each type offers unique sensory characteristics derived from its mineral composition, crystal structure, and production method. Sea salts from different coastal regions contain trace minerals and briny notes, while rock salts mined from ancient underground deposits provide earthy flavors and coarse textures. Flake

salts, produced through evaporation or mechanical processing, feature delicate, pyramid-shaped crystals that melt quickly on the palate, adding a light crunch and mild salinity (Ercoşkun, 2023; Salçın, 2021; Sevinç, 2021).

In diverse culinary contexts, gourmet salt is valued for its ability to enhance the taste and texture of dishes. Chefs use gourmet salt as a finishing touch for salads, grilled meats, seafood, and desserts, adding complexity and depth to the flavors. Additionally, it is used as a seasoning agent and decorative element in specialty cocktails, chocolates, and artisanal confections (Carapeto et al., 2018; Ercoşkun, 2021; Kamil Bourhan, 2022).

While gourmet salt offers unique sensory experiences and culinary benefits, its sodium content and potential health impacts should be considered. Moderation is essential, especially for individuals with hypertension or cardiovascular issues. However, gourmet salt may contain higher levels of trace minerals compared to refined table salt, contributing to flavor complexity (Heshmati et al., 2014; Şafak, 2023).

Gourmet salts are often served at the table, earning the term “finishing salts.” Gourmet salts and finishing salts are high-quality salts utilized to enhance the flavor and presentation of dishes, yet they serve distinct purposes and possess unique characteristics. Gourmet salts typically constitute specialized salts harvested using traditional methods and containing unique mineral compositions. These salts are employed throughout various stages of the cooking process. Conversely, finishing salts form a subset specifically utilized to add a final touch to a dish before serving. Their primary objective is to enhance the flavor, texture, and visual appeal of the finished dish (Kamil Bourhan, 2022; Salçın, 2021; Sevinç, 2021; Şafak, 2023).

While gourmet salts may include sea salt, rock salt, flake salt, and flavored salts, finishing salts generally stand out with their flaky or coarse textures, providing a pleasant crunch. Gourmet salts exhibit a broad spectrum of textures, ranging from fine to coarse grains. However, finishing salts are typically characterized by their flaky or coarse textures to provide a satisfying crunch (Lugendo and Bugumba, 2021; Taş, 2021; Wong, 2018).

Gourmet salts find application across various stages of the cooking process, such as seasoning, brining, and baking, whereas finishing salts are predominantly utilized as a final touch to enhance the flavor, texture, and presentation of a dish. While gourmet salts offer nuanced flavors that develop during cooking, finishing salts provide a more immediate and intense burst of flavor (Kamil Bourhan, 2022; Salçın, 2021; Sevinç, 2021; Şafak, 2023; Wong 2018).

Kitchen Applications

Finishing salts are primarily used at the end of cooking to enhance flavor and texture. The effectiveness of finishing salt lies in its unique physical and chemical properties. Unlike finely ground and refined table salt containing additives to prevent clumping, finishing salts are left in their natural state, preserving their mineral content and crystal structures. This results in slower dissolution on the palate, providing a prolonged and nuanced flavor experience (Dahl, 1958).

Minerals such as magnesium, calcium, and potassium found in finishing salts also contribute to their distinct flavors. These minerals interact with other components of the dish, enhancing and complementing flavors in ways that pure sodium chloride cannot provide (Kamil Bourhan, 2022; Moss, 1993; Salçın, 2021; Sevinç, 2021; Silva, 2007; Şafak, 2023). Here are some common kitchen applications:

1. **Flavor Enhancement** The primary role of finishing salt is to enhance the natural flavors of the dish. Sprinkling a small amount of finishing salt just before serving allows chefs to further accentuate the flavors of the ingredients. The unique mineral content and texture of finishing salts create a subtle yet profound impact on the palate.
2. **Texture Addition** The unique crystal structure of finishing salts adds a pleasant crunch to dishes. This textural element elevates the dining experience by providing a delightful contrast to the soft or smooth components of the dish. For example, sprinkling fleur de sel over a piece of seared fish or a chocolate dessert can add an unexpected and enjoyable crunch.
3. **Presentation Enhancement** Finishing salts come in various colors and crystal shapes, making them an excellent tool for enhancing the visual appeal of a dish. The vibrant pink color of Himalayan salt, the deep black hue of lava salt, or the sparkling crystals of fleur de sel can transform a simple meal into a visually stunning creation.
4. **Balancing Sweetness** Finishing salts can be used not only for savory dishes but also to balance sweetness in desserts. A sprinkle of Maldon sea salt over a caramel tart or chocolate truffle can harmonize the sweet and salty flavors, enhancing the overall taste profile of desserts.

Composition of Main Gourmet Salts

Finishing salts are typically crafted from high-quality, natural, and mineral-rich salts. They are added at the final moments to enhance the flavor of a dish or dessert and are often consumed raw. These salts are utilized not only for special dishes or elegant presentations but also in various culinary applications. The most preferred gourmet salts vary depending on personal taste preferences, culinary applications, and

desired flavor profiles. However, some of the most popular gourmet salts among chefs and food enthusiasts include (Nafees et al., 2013).

Fleur de Sel: Fleur de sel, or “flower of salt,” is often hailed as the queen of finishing salts. Harvested from the surface of salt ponds in coastal regions like Brittany, France, fleur de sel forms delicate, flower-like fine crystals rich in minerals. Its delicate taste, subtle crunch, and high mineral content make it perfect for complementing dishes like salads, grilled vegetables, and premium meats. Renowned for its delicate flavor and high mineral content, fleur de sel adds a sophisticated touch to finishing dishes. This salt begins to crystallize in hollow inverted pyramid shapes on the surface of the water, and depending on the temperature and wind, the growing salt crystals are harvested from the surface before sinking to the bottom. When the salt crystallizes, it acquires a distinct scent reminiscent of lime blossoms (Di Salvo et al., 2023).

Sel Gris: Also known as “gray salt,” sel gris is harvested from salt evaporation ponds in coastal regions like the Guérande area of France. It has a slightly moist texture and a salty taste with subtle mineral notes. Sel gris is preferred by chefs for its versatility and ability to add depth to both savory and sweet dishes. It is commonly used in meat rubs, sauces, and caramel desserts (Baş, 2022; Di Salvo et al., 2023; Ercoşkun, 2023).

Maldon Sea Salt: Hailing from the town of Maldon in Essex, England, Maldon sea salt is known for its large pyramid-shaped crystals. This salt is harvested using traditional methods passed down through generations. Instead of sun-drying the salt with the heat of the sun, the saturated salty seawater is left to crystallize naturally through self-crystallization by heating the seawater. Maldon salt stands out for its clean, salty flavor and distinctive texture. Harvested using traditional methods of evaporating seawater in shallow pans, it forms crisp, textured

salt crystals. Maldon sea salt is often used as a finishing salt to enhance the natural flavors of dishes like salads, seafood, and grilled vegetables. Various types of Maldon salts are produced, including flaked Maldon salt, smoked Maldon salt, and Maldon salts infused with various spices (Baş, 2022; Ercoşkun, 2021; Wong, 2018).

Himalayan salts are a natural salt typically mined from the foothills of the Himalayas, exhibiting different color tones such as black, white, pink, and red. Due to its mineral content and aesthetic appeal, Himalayan salt is widely used both in the kitchen and as a decorative item. **Black Himalayan Salt (Kala Namak):** Commonly known as “black salt,” this type of salt is widely used in South Asian cuisine. It is characterized by its distinctive sulfur smell and varying color tones. It is particularly used to impart an egg-like flavor, especially in vegan cooking. Kala namak is actually a sodium chloride (NaCl)-based salt but exhibits unique properties due to other minerals and compounds it contains. Particularly, sulfur compounds give this salt its unique aroma and flavor. Kala Namak consists of 97-98% sodium chloride and the remainder consists of iron oxide, iron sulfide, sodium sulfate, and sodium bisulfate. It is also used in traditional Indian Ayurvedic medicine and bath applications. Due to its ability to mimic the taste of eggs, Kala Namak is used in vegan dishes. With its distinct flavor, it is used as a spice in various Indian and Pakistani dishes, especially in foods like chaat and raita. The sulfur compounds are responsible for the characteristic smell and taste of this salt. **White Himalayan salt**, comprising large crystals, consists of up to 99% sodium chloride (NaCl). However, it contains fewer minerals compared to pink Himalayan salt and thus appears bright white. The pink, orange, and red hues of Himalayan salts vary depending on the iron compounds they contain. Salts with low iron content appear white, while those with higher iron content appear orange and red.

The composition of inorganic iron and sulfur compounds in the human body is an important food safety issue (Eftekhari et al., 2014; Rehan et al., 2021; Sani et al., 2022).

Japanese gourmet salts are renowned for their purity and unique flavors, highly valued in the culinary world for their exceptional quality and versatility. Some popular Japanese gourmet salts include (Ji, 2000; Lefond, 1969; Wong, 2018)

1. **Yukishio (Snow Salt):** Yukishio, a traditional Japanese salt, is made by evaporating seawater collected during the winter months when snowfall is most intense. This salt is prized for its delicate taste and fine texture, making it ideal for dishes like sashimi, grilled fish, and other delicate foods.
2. **Shio (Natural Sea Salt):** Shio, a general term for natural sea salt in Japanese cuisine, is harvested from seawater through evaporation and contains trace minerals that contribute to its complex flavor profile. Shio is used in a wide range of Japanese dishes, including soups, rice dishes, and pickles.
3. **Sancho Salt:** Sancho salt is infused with the citrusy and peppery flavor of Japanese sansho peppers. This aromatic salt adds a unique touch to dishes like grilled meats, seafood, and vegetables, enhancing their flavors. It is also commonly used as a finishing salt for sushi and sashimi.
4. **Matcha Salt:** Matcha salt is made by blending high-quality Japanese green tea powder (matcha) with sea salt. This vibrant green salt adds a subtle earthy flavor and color to dishes, making it perfect for grilled meats, roasted vegetables, and salads.
5. **Wasabi Salt:** Wasabi salt combines the sharp pungency of wasabi with the salty umami taste of sea salt. This flavorful salt is commonly used in dishes like sushi, sashimi, and tempura, adding a spicy kick to every

bite. It also enhances the flavor of rice dishes, noodles, and grilled meats.

6. **Umeboshi Salt:** Umeboshi salt is made by drying and grinding pickled Japanese plums (umeboshi) and blending them with sea salt. This tangy and salty seasoning is widely used in Japanese cuisine to add acidity and depth to dishes like rice, noodles, grilled fish, and tofu.

Korean gourmet salts are known for their diverse flavors and culinary versatility, playing a critical role in adding depth and complexity to Korean cuisine. Here are some popular Korean gourmet salts (Ji, 2000; Lefond, 1969; Wong, 2018):

1. **Gulgeun-sogeu (Korean Flake Salt):** Gulgeun-sogeu, also known as Korean flake salt, is a type of sea salt harvested from the shores of Korea. With its delicate texture and mild flavor, it is a versatile seasoning for a wide range of Korean dishes, including grilled meats, seafood, vegetables, and soups.
2. **Bokbunja-sogeu (Black Raspberry Salt):** Bokbunja-sogeu, a unique Korean gourmet salt filled with the flavor of black raspberries, adds a fruity and slightly sweet taste to dishes like grilled meats, salads, and desserts. It also pairs well with savory dishes, adding a hint of sweetness and complexity.
3. **Gireum-sogeu (Roasted Salt):** Gireum-sogeu, or roasted salt, is a type of Korean salt made by roasting sea salt at low heat, resulting in a rich, nutty flavor. This delicious salt is commonly used to season grilled meats, vegetables, and rice dishes, adding depth and complexity to the overall flavor profile.
4. **Jogyong-sogeu (Bamboo Salt):** Jogyong-sogeu, also known as bamboo salt, is a special Korean salt made by sealing sea

salt in bamboo cylinders with clay. This traditional method of salt production provides a unique flavor and mineral profile, making bamboo salt highly valued in Korean cuisine. It is used as a seasoning for soups, stews, marinades, and herbal remedies.

5. **Dasima-sogeu (Kelp Salt):** Dasima-sogeu is a type of Korean gourmet salt filled with the aroma of dried kelp (dasima). This savory salt adds an umami flavor to dishes like soups, stews, and noodle dishes, as well as serving as a finishing salt for grilled meats and seafood.

Hawaiian gourmet salts are famous for their unique flavors, vibrant colors, and rich mineral compositions, serving as valuable ingredients in both Hawaiian and international cuisines. Here are some popular Hawaiian gourmet salts (Baş, 2022; Jacobson, 2020; Kurlansky, 2002):

1. **Alaea Salt:** Alaea salt, also known as Hawaiian red salt, is a traditional sea salt mixed with volcanic red clay (alaea) collected from the islands of Hawaii. The clay imparts a reddish-pink color and adds a subtle earthy flavor to the salt. Alaea salt is commonly used in Hawaiian cuisine to season meats, seafood, and traditional dishes like kalua pig and poke.
2. **Hawaiian Black Lava Salt:** Hawaiian black lava salt is a striking sea salt mixed with activated charcoal derived from coconut shells. The charcoal gives the salt a black color and adds hints of sweetness and smokiness. This gourmet salt is used as a finishing salt for grilled meats, roasted vegetables, and seafood dishes, as well as a decorative garnish for desserts.
3. **Hawaiian Pink Sea Salt:** Hawaiian pink sea salt is a delicate sea salt harvested from the clean waters surrounding the Hawaiian islands. Its pale pink color comes from natural minerals present in the seawater, such as iron oxide and alaea clay. This light

and slightly sweet salt is ideal for seasoning salads, fruits, vegetables, and light seafood dishes, adding a subtle flavor and visual appeal.

4. **Hawaiian Green Sea Salt:** Hawaiian green sea salt, also known as bamboo jade salt, is a unique sea salt infused with bamboo leaf extract, giving it a vibrant green color and refreshing flavor. Bamboo leaf extract adds antioxidants and phytonutrients to the salt, enhancing both its flavor and health benefits. Hawaiian green sea salt is commonly used as a finishing salt for sushi, sashimi, salads, and other light dishes, providing a refreshing and herbaceous taste.
5. **Hawaiian Red Gold Salt:** Hawaiian red gold salt is a premium sea salt harvested from the shores of Molokai, Hawaii. Hand-harvested using traditional methods and sun-evaporated to preserve its natural mineral content, this luxury salt has a delicate texture and rich, salty flavor. Hawaiian red gold salt is valued by chefs for its superior quality and is used as a finishing salt for a wide range of dishes, including grilled meats, seafood, salads, and desserts.

Blue salt, also known as “Persian blue salt” or “Iranian blue salt,” is a valuable and exotic gourmet salt distinguished by its striking blue color and unique flavor profile. It is extracted from ancient salt mines in the Semnan province of Iran and has been produced there for centuries (Kurlansky, 2002). The distinctive blue hue of this salt is attributed to the presence of sylvinit, a mineral compound containing potassium chloride and sodium chloride, found in the underground deposits. The process begins with the extraction of the salt from deep mines underground, followed by hand-picking and washing of the crystals to remove impurities. This natural coloring arises from the interaction between the mineral content of the salt and the unique geological formations in the region (Abdi et al., 2021; Cheraghali et al., 2010).

Characterized by its delicate texture and subtle, mildly sweet flavor, blue salt contains subtle mineral undertones. It is less salty than common table salt, making it ideal for seasoning dishes without overpowering other flavors. The striking appearance and complex flavor profile of the salt make it a popular choice for both culinary and decorative purposes. Overall, blue salt stands out as a rare and luxurious ingredient that adds visual appeal and subtle flavor complexity to a wide range of dishes. Whether used in cooking or as a finishing touch, this magnificent gourmet salt will elevate any kitchen creation, enchanting the senses with its dazzling blue hue and delicate taste (Khaniki et al., 2007; Shariatifar et al., 2017).

Algarve Sea Salt: Algarve Sea Salt is a natural sea salt obtained from the Atlantic Ocean in the southern region of Portugal known as Algarve. Sea water is collected in special pools and evaporated under the sun’s influence to form salt crystals. These crystals are gathered, cleaned, and processed (Di Salvo et al., 2023; Ercoşkun, 2023).

Italian Gourmet Salts: Italian gourmet salts encompass a diverse range of salts produced along the Mediterranean shores of Italy, renowned for their distinctive flavors and textures. These salts are usually harvested through traditional methods across various regions of Italy, each contributing unique mineral compositions and taste profiles. They are highly esteemed in gourmet cuisine for their ability to enhance the flavors and textures of dishes, offering a spectrum that spans from delicate nuances to intense flavor profiles (Baş, 2022; Ercoşkun, 2023; Di Salvo et al., 2023, Taş, 2021).

Maras salt: Peruvian salt, is a type of gourmet salt harvested in the Maras salt mines located in the Sacred Valley of the Incas in Peru. These salt pans have been in use since Incan times and are still actively harvested today using traditio-

nal methods. It is harvested by evaporating salty water from natural springs that emerge from the mountainside, leaving behind delicate salt crystals. The salt is hand-harvested and sun-dried, resulting in a flaky texture and a mild, slightly sweet flavor. This salt is highly regarded in gourmet cuisine for its purity, unique color, and subtle flavor profile. It is often used as a finishing salt to sprinkle over dishes just before serving to enhance their flavors and add visual appeal (Baş, 2022; Ercoşkun, 2023; Di Salvo et al., 2023; Taş, 2021).

Polish Natural Rock Salts: Poland is home to several notable salt mines, each with its own unique history and significance. There are three salt mines in Poland (Baş, 2022; Ercoşkun, 2023; Di Salvo et al., 2023, Taş, 2021):

1. **Wieliczka Salt Mine:** Located near Kraków, the Wieliczka Salt Mine is one of the oldest operating salt mines in the world. It has been continuously worked since the 13th century and is a UNESCO World Heritage Site. The mine features stunning underground chambers, chapels (such as the famous St. Kinga's Chapel), and sculptures carved entirely out of salt by miners over the centuries. It is a popular tourist destination and offers guided tours showcasing its historical and cultural importance.
2. **Bochnia Salt Mine:** Situated near the town of Bochnia, southeast of Kraków, the Bochnia Salt Mine is another ancient salt mine in Poland. It dates back to the 13th century and is one of the oldest salt mines in Europe. Similar to Wieliczka, Bochnia Salt Mine includes underground chambers, chapels, and tunnels carved from salt rock. It is also recognized as a UNESCO World Heritage Site and offers visitors a glimpse into the history of salt mining in Poland.
3. **Kłodawa Salt Mine:** Located in central Poland, near the town of Kłodawa, this salt mine is known for its extensive deposits of

rock salt. It is one of the largest and most productive salt mines in Poland, supplying various industries with salt products.

These salt mines not only have historical and cultural significance but also contribute to Poland's economy and continue to attract tourists and visitors from around the world who are fascinated by their underground wonders and rich histories.

Izmir flake salt, also known as İzmir tuz, is a type of gourmet salt that originates from the coastal region of Izmir, Türkiye. This salt is prized for its delicate, flaky texture and its characteristic bright white appearance. Izmir flake salt is traditionally harvested from the waters of the Aegean Sea near Izmir. Saltwater is collected in shallow pools or pans, where it is left to evaporate under the sun and wind. As the water evaporates, thin, delicate flakes of salt form on the surface of the brine. The flakes of Izmir salt are thin and irregularly shaped, giving them a light, crunchy texture. They are usually bright white in color and have a clean, briny flavor. Izmir flake salt is popular in gourmet cuisine as a finishing salt. Its flaky texture and mild flavor make it ideal for sprinkling over dishes just before serving to add a touch of salinity and a bit of crunch. It is often used on salads, grilled vegetables, fish, and meats to enhance their flavors (Baş, 2022; Ercoşkun, 2023; Di Salvo et al., 2023, Taş, 2021).

Çankırı rock salt: Çankırı rock salt, mined in the Çankırı province of central Türkiye, originates from ancient salt deposits formed approximately thirty-five million years ago following the drying up of the Tethys Ocean. These deposits lie underground in the Çankırı region and are primarily composed of high-purity sodium chloride (NaCl) with various trace minerals (Ercoşkun, 2023; Hançerlioğlu & Eyüpoğlu, 2022).

Accessing these salt deposits involves excavating large chambers and tunnels, totaling a gal-

lery length of 27 kilometers. The salt is extracted, crushed, and processed into different forms suitable for various applications. Çankırı rock salt typically appears whitish or light gray, with variations in color depending on its mineral composition. Its natural purity and low impurity levels distinguish it from other types of salt (Taş, 2021).

Within the salt mine, clear salt veins are found. These white salts are used in butter, hence they are referred to as butter salt. Impurities in regular rock salt can cause butter to oxidize quickly and become bitter. Butter salt, with its minimal impurities, delays butter oxidation, thanks to its bright white, large crystals, hence its name derived from butter (Ercoşkun, 2021).

Food Safety Risks in Gourmet Salts

Excessive salt consumption is recognized as a significant factor contributing to the development of various health conditions, including cardiovascular diseases, hypertension, kidney diseases, osteoporosis, stomach diseases, obesity, and several others. In response to these concerns, health institutions worldwide are actively engaged in efforts to reduce salt intake among populations (Ercoşkun, 2021; Gündoğdu, 2018).

The World Health Organization (WHO) has provided specific guidelines regarding salt intake, recommending that adults should limit their daily salt consumption to no more than 5 grams. However, the global average daily salt intake ranges from 9 to 12 grams, indicating a widespread challenge in adhering to these recommendations (Baş, 2022).

While salt is a common dietary component, it can also pose significant risks to food safety. Salt may contain various contaminants, including radioactives, heavy metals, microplastics, residues from dynamite, and exhaust pollutants. These contaminants can enter salt during the

production process or through environmental contamination, raising concerns about their potential health impacts when consumed (Ercoşkun, 2021).

Radioactive elements, such as radium and uranium, can naturally occur in salt deposits and may accumulate during salt production. Heavy metals, including lead, mercury, and cadmium, may contaminate salt through environmental pollution or during the refining process. Microplastics, tiny plastic particles, have been increasingly detected in salt samples worldwide, highlighting concerns about plastic pollution in the environment and its potential implications for human health (Hançerlioğlu & Eyüpoğlu, 2020).

Residues from dynamite used in salt mining operations can also pose risks if not properly controlled, as they may contain hazardous chemicals that can contaminate salt products. Additionally, exhaust pollutants from industrial activities or transportation can settle on salt surfaces, potentially introducing harmful substances into the salt supply chain (Ercoşkun, 2021).

In conclusion, excessive salt consumption poses significant health risks, contributing to the development of various diseases. Moreover, salt can be a source of food safety concerns due to the presence of contaminants such as radioactives, heavy metals, microplastics, dynamite residues, and exhaust pollutants. Addressing these challenges requires comprehensive strategies to promote healthier dietary habits and ensure the safety of salt products through rigorous quality control measures and environmental management practices (Ercoşkun, 2021; Gündoğdu, 2018; Hançerlioğlu & Eyüpoğlu, 2020).

Conclusion

Gourmet salts play a significant role in the evolving world of gastronomy, enhancing the flavor, texture, and visual appeal of dishes. Varieties

such as sea salt, rock salt, flake salt, and infused salts offer unique mineral compositions, colors, and flavor profiles that elevate culinary creations. These salts not only boost the taste but also add an aesthetic dimension to food presentation. However, considering the sodium content of gourmet salts, their balanced use is essential for maintaining a healthy diet. This article highlights the multifaceted role of gourmet salts in the kitchen, providing valuable insights for both professional chefs and home cooks.

Education and Awareness: Chefs and cooks should be educated about the different types of gourmet salts and their culinary applications to fully utilize their potential in enhancing dishes. **Balanced Use:** While leveraging the flavor-enhancing properties of gourmet salts, it is crucial to monitor sodium intake to promote a balanced and healthy diet.

Development of New Recipes: The unique flavors and mineral compositions of gourmet salts can inspire new and creative recipes. Chefs can use these salts to add modern twists to traditional dishes.

Source and Quality: Understanding the sources and production processes of gourmet salts ensures the selection of sustainable and high-quality products, benefiting both the environment and culinary outcomes.

Health-Friendly Alternatives: Increasing the use of gourmet salts with lower sodium content or enriched with various minerals can contribute to a more balanced diet, offering both flavor and health benefits.

In conclusion, gourmet salts are indispensable in gastronomy, serving both traditional and innovative culinary approaches. Their mindful and informed use is essential for achieving the best results in terms of both flavor and health.

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