Seafood Flavors

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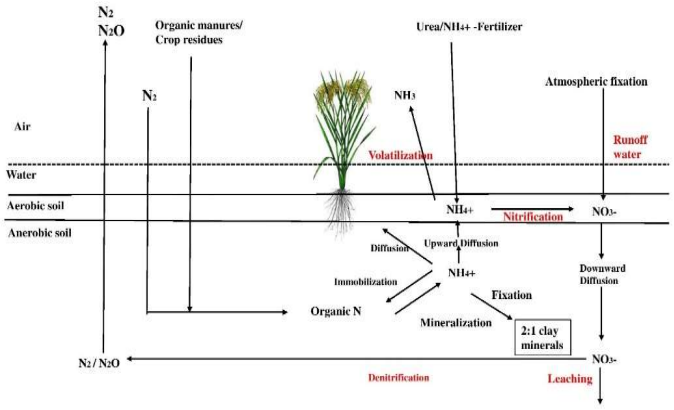
SUMMARY

Aroma and flavor are key factors in the food industry, especially as the demand for natural and sustainable products grows. Natural flavors present challenges for both education and businesses, affecting how consumers perceive and enjoy food and beverages. These flavors are categorized by origin and composition, with various isolation methods and sensory research approaches available. Microorganisms are valuable tools for enhancing food product flavor profiles. Additionally, assessing the toxicity of odors that could harm consumers is essential. Flavourings have many applications in the food industry. In this article, we explore the world of flavor and aroma, with a focus on seafood.

INTRODUCTION

Flavors in food result from a mix of natural and synthetic ingredients. These components, whether single compounds like benzyl acetate or mixtures such as vanilla bean extract, are used to enhance the taste of processed food. The introduction of synthetic flavor chemicals like Vanillin and Coumarin in 1868 marked a turning point in artificial flavor creation, with the flavor and perfume market projected to reach $16 billion by 2013. Most flavor compounds are synthetically produced, with only a small portion derived from natural sources. The distinct, delicate flavors of fresh fish come from volatile carbonyls and alcohols with carbon chains of 6, 8, and 9. Marine fish often exhibit sea-like or iodine-like hints due to bromophenols acquired from their environment. The combination of carotenoid pigments and polyunsaturated fatty acids creates the unique aroma of premium salmon. However, the quality of fish flavor deteriorates over time due to microbial and enzymatic processes.

Fresh fish flavor is rooted in polyunsaturated fatty acids, which produce



key 6-, 8-, and 9-carbon aldehydes, ketones, and alcohols through lipoxygenase action. Lipoxygenases selectively generate specific carbonyls and alcohols, giving fresh fish its unique aroma. Freshwater fish typically contain 6-carbon volatile chemicals reminiscent of green plants, while most fish have 8-carbon volatile compounds responsible for plant- and metal-like odours. Some fish species possess 9-carbon compounds, resulting in cucumber-like scents. Lipoxygenases play a role in fish scent and flavor production, with identified enzymes in gill tissue and skin. They create hydroperoxides in the skin, leading to fishy and oxidized flavors during storage. Random autoxidation generates stale flavors, replacing freshness. Enzymatic processes significantly enhance the flavor of raw fish,

particularly in pickled fish like herring and smelt.

Classification of flavours

According to KR et al. (2022), a wide range of substances, encompassing hydrocarbons, alcohols, aldehydes, ketones, acids, esters, and lactones, serve as food flavouring additives, originating from diverse chemical families. These compounds are categorized into various groups based on their sources or place of origin. The three categories of flavours are:

- Natural
- Natural identical
- Artificial

Natural Flavoring:

Natural flavoring is derived from plant or animal sources through physical isolation or enzymatic and microbiological activities. Chemical techniques may also be used for the synthesis or isolation of specific chemicals to create biologically accurate flavors. Artificial flavors are not typically added to natural products. These flavors are extracted from raw materials obtained from plants, animals, or a combination of both sources. They can be produced through processes like fermentation or de novo bacterial synthesis, where whole microbial metabolism is utilized to synthesize various flavor compounds, such as alcohols, aliphatic acids, esters, lactones, aldehydes, ketones, and sulphur compounds.

Natural Identical Flavoring:

Esters, aldehydes, ketones, acids, and lactones are flavors that closely resemble those found in nature and can be synthesized through chemical processes or derived from natural substances, including microbial fermentation and enzyme utilization.

Artificial Flavoring:

Artificial flavoring compounds are food additives not found in natural products. They are distinguished from natural and natural-identical flavourings by the absence of natural items in which they are found. Hydrocarbons are rarely used in the flavor and fragrance industries but are abundant in nature and serve as building blocks for various essential aromatic compounds.

Hydrocarbons:

Hydrocarbons, including aliphatic and cyclic terpenes, and benzene rings, are found in nature and can serve as essential building blocks for flavor and fragrance compounds. Unsaturated aliphatic non-terpene hydrocarbons, known as galbanum compounds, are significant, with examples like (E,E)-1,3,5-undecatriene found in pineapple and used for its fruity, peppery, greasy, and waxy notes. These hydrocarbons play a versatile role in creating green fruit and herbal flavors and fragrances.

Terpenes:

Terpenoids, often used as flavor enhancers, are predominant constituents in essential oils, with various types found in different plant parts. They contribute to a range of scents, from fruity and floral to woody and balsamic, and are used in various food products. Notably, citral, 1,8-cineole, menthol, D-carvone, ionones, and damascones are important terpenes with distinct aroma profiles.

Alcohols:

Aliphatic alcohols include simple and branched chains and can be found in a variety of foods and beverages. They generally have a gentle, refreshing, and somewhat ethereal aroma and flavor. Examples like N-amyl alcohol, N-heptanol, and trans-2-hexenol are found in different food products and contribute to their unique sensory characteristics.

Aldehydes and Ketones

Acetaldehyde is an important component of fruit flavor despite its volatility. Vanillin is a significant aromatic aldehyde. Aliphatic

monoketones have minor significance in flavor and fragrance compounds. 2-Alkanones (C3-C15) are present in various fruits and foods but do not significantly impact their scent. Acetoin and 2, 3-butanedione are economically important aromatic compounds

Side Effects and Toxicity of Flavoring

Flavoring compounds are added to food products to enhance their flavor, but their use raises health concerns. Regulatory authorities evaluate toxicological data and establish limitations on food flavorings. Although flavor and extract products have low concentrations in food and are generally recognized as safe (GRAS), some compounds like esters and methyl anthranilate may cause irritation and health issues at certain concentrations, and safety guidelines should be followed.

CONCLUSION

Many compounds intentionally added to food and feeding materials fall into the category of flavorings, which are concentrated mixtures designed to enhance taste, including sweet, sour, or salty flavors. While these components are typically found in small amounts within food products, they are not meant to be consumed on their own. The flavor industry is essential for ensuring consumer satisfaction, as people actively avoid artificial flavors, believing them to be potentially harmful. Taste molecules are created through microbial enzymes produced by recombinant bacteria. Food is enriched with flavor agents to improve taste and maintain freshness, preserving the authentic flavor profile. One prominent flavoring agent is seafood flavor, derived from shellfish, finfish, and prawns, such as cod, pollock, and lobster. Various methods, like aqueous extraction, fermentation, and enzymatic hydrolysis, are used to produce seafood flavor. It can be a single extract or a blend of extracts from these sources or a concentrated seafood paste, incorporating diverse seafood origins.

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