



Spices, Seasonings, and Flavors—Achieving the Desired Result

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Abstract: Creating a meat entree that provides a pleasant gastronomic experience is a combination of art, science, and technology. Spices and flavorings are used to achieve that experience, each contributing to the overall taste that is often unique to the region of its origin. Flavorings have the ability to be tailor made and offer the unique ability to provide a taste that cannot be easily developed through preparation processes.

Key words: spices, seasonings, flavorings, cuisines, taste, Maillard

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Introduction: A Spicy World

According to history, the original use of spices is said to have occurred when our ancestors wrapped their meat in leaves, as a form of primitive packaging to keep it free from contaminants during cooking (Quintana and Rosen, 1993). They found that the leaves from certain plants would impart desirable flavors that were very complimentary to the flavors that developed in the meat. As time advanced, certain spices and herbs were sought to intentionally impart flavors into the foods as they were being prepared. As the spice trade developed, spices became so well revered that economies were built around spices. Spices have a very colorful history, at one time costing the lives of brave individuals who sacrifice all to bring some of the bounty home and open new routes for future commerce. Black pepper was used as currency in various regions and is the basis for the term “peppercorn rent” in England land deals (Tarlton Law Library, 2018). Many found political power and riches in spices and funded multi-year expeditions to find new sources. Magellan was one explorer charged with finding a new route to

the Spice Islands (Maluku Islands, Indonesia). The expedition left Spain with 5 ships, 270 men, and enough supplies to support a 2-year mission. Three years later, 1 ship returned carrying 18 men and about 50,000 pounds of spices. Magellan, unfortunately, had been killed in a bloody battle in the Philippines (Biography.com Editors, 2014). Spices were the inspiration for many more explorers willing to sacrifice their lives to find new sources. There was no sacrifice too large to quell the desire to lead world expeditions to find spices.

Although spices were embellished for their flavor contributions to world cuisines, food was not the only application for spices. A symbol of power and wealth, spices were used to provide a level of dignity as the transition was made from the living world to the spirit world. The embalming of pharaohs and kings included aromatic spices that helped not only to preserve the body and make it fit to enter the afterlife but also to cover up the odor of decomposition. It was not uncommon to find cinnamon and other aromatic spices used as a way to keep the body fresh and with minimal odor. Peppercorns were stuffed into the nose to maintain the shape of the noble nostrils (Schmidt, 2014).

Regional Use of Spices

Cuisines around the world differ in both taste and texture. Some of these differences can be attributed to local availability of spices, but a global phenomenon has been observed that cuisines in warmer climates are traditionally spicier than those in colder climates. There is evidence that the selected use of spices can be explained by the protective effects of the phytochemicals that are contained within. Spices have antimicrobial and antiparasitic properties (Cichewicz and Thorpe, 1996; Lv et al., 2015) and help protect people from meat and other proteins that would normally spoil rather quickly in a hot climate. It is also well known that some phytochemicals—such as those in cloves, rosemary, sage, pepper, and mace—are powerful antioxidants (Yashin et al., 2017). And in cases wherein the shelf life of the meat has expired, spices can help to mask off-flavors. People who prepared spicy dishes had a higher chance of survival (Lv et al., 2015) and most likely instructed their offspring to use spices as well.

Sherman and Billing (1999) evaluated the spices used in meat recipes from 36 countries around the world. Of the 30 spices for which test results were found, all were found to inhibit at least 25% of the bacterial species, and 15 of the spices inhibited at least 75% of the bacterial species. Sherman and Billing (1999) also state that garlic, onion, allspice, and oregano were the most potent spices. The lavish use of spices to both extend shelf life and cover bad aromas continued until the Renaissance, at which point excessive use of them was considered vulgar.

Microbial Aspect of Spices

Inasmuch as spices help to control microorganisms, they can also harbor foodborne organisms. Between 1973 and 2010, there have been 14 outbreaks of foodborne illness in which spices have been the implicated medium of transfer (U.S. Food and Drug Administration, 2017). The largest spice-associated foodborne illness outbreak occurred in Germany in 1993, involving an estimated 1,000 cases. The primary vehicle for that outbreak was paprika on potato chips. In the United States between 2007 and 2010, there were 3 outbreaks with 457 confirmed illnesses, 68 hospitalizations, and 1 death. *Salmonella* sp. and *Bacillus* sp. have been the organisms responsible for the outbreaks. The microbial quality of imported spices varies, but typically, the prevalence of *Salmonella* is, on average,

6.6% (U.S. Food and Drug Administration, 2017). In comparison, *Salmonella* prevalence is 3.4% on all other Food and Drug Administration–regulated foods. These microbial risks are due to growing regions, harvesting practices, and storage conditions.

Effective reduction of foodborne pathogens can be a challenge for spices owing to their irregular shape and their susceptibility to moisture and heat. A variety of microbial interventions are commonly used to increase food safety. Ethylene oxide and propylene oxide are 2 gases that are very effective against pathogens. Both are applied via vacuum or under pressure to ensure complete coverage of the item. Because of its increased surface area, leafy vegetation is more cumbersome to fumigate than are seeds or stems. Irradiation is most effective for mitigation purposes, but it has limitations related to acceptability. When none of the other applications can be used, steam treatment is an available method for microbial reduction, but it is limited because of its moisture and heat, both of which can be detrimental to herbs and spices.

Seasoning Blends From Around the World

The global seasoning and spices market was valued at USD 13.77 billion in 2019 and is expected to grow at a compound annual growth rate of 6.3% from 2020 to 2027 (Grandview Research, 2020). There has been an increasing willingness to pay a premium for new flavors and exotic tastes. New demand for authentic flavors and tastes of different ethnic groups from around the world has fueled growth of the market. Furthermore, rising demand for ready-to-use spice mixes as convenient options in the food service industry is expected to open new avenues. Seasonings and spices have been experiencing a remarkable demand from the commercial and household sectors, due not only to their taste and flavor but also to their associated health benefits.

Berberé is the backbone of many Ethiopian recipes and is used in many forms, including as a rub or seasoning for vegetables and lentils. The complex seasoning or paste can vary by region or town—and even from family to family. Berbere always includes hot chilies and fenugreek but can also incorporate garlic, allspice, red pepper, ginger, coriander, cinnamon, and black pepper.

Mexico City remains one of the most populated cities in the world, a bustling metropolis that stands in stark contrast to the more traditional lifestyles in

rural areas. Mexican-style chorizo is a hot and spicy seasoning that contains paprika, caramelized chili pepper, cumin, oregano, cloves, and garlic. The caramelized chili pepper adds a warm sweetness without distracting from the heat and spice, which adds an extra kick without overpowering the other flavors in the dish.

Yuzu is a citrus fruit cultivated in China, Japan, and Korea, which is hardy enough to grow even in cold climates. This tart fruit is best known for its use in marinades and dressings. Yuzu pepper can come in a variety of combinations, which can include yuzu zest, garlic, Thai chili, and salt. Other iterations of yuzu seasonings can vary in flavors and spiciness, with some being sweet.

Starting in the 8th century, Morocco served as the crossroads of the Middle East, Europe, and sub-Saharan Africa. The many disparate groups traveling through over the ages have each left a mark on the country and its culture. Ras el hanout is a spice blend in this region and is used in many savory dishes or rubbed on meat or fish. Although no two ras el hanouts are the same, they can include salt, cinnamon, mace, cardamom, turmeric, cumin, coriander, allspice, black pepper, and ginger. Some blends can include 30–50 spices, and legendary versions are said to have had 100 ingredients.

Flavorings

Flavor is the distinctive taste and aroma of food and drink. Flavorings are added to create desired tastes and aromas. Basic taste comprises the nonvolatile components of the food, such as saltiness, bitterness, sour, sweet, and umami. Aroma comprises the volatile components of food and is perceived through nasal and retro-nasal routes. A combination of basic taste, aroma, and texture constitute a food's flavor.

Flavorings can be natural or artificial. The primary difference between natural flavors and artificial flavors is that the former is of plant or animal origin whereas the latter is synthetic. Natural flavors are removed from the source or are created through cooking or fermentation. Their significant function is flavoring rather than a nutritional source. If they are not derived from a spice, fruit, vegetable, herb, bark, bud, root, leaf, meat, fish, poultry, eggs, dairy, or fermentation, they are considered artificial.

Compound flavors are developed by blending flavoring ingredients based on the profile desired. One kilogram of a natural flavor ingredient can equal the strength of flavor supplied by 300 kg of fresh product, resulting in a balance of flavors to achieve the desired target. Secondary notes may be added to enhance the

profile and customize the flavor. The flavor ingredients may be solid (powder) or liquid and may require dilution to be distributed appropriately depending on the strength of the flavor that is desired.

Compound flavors use existing flavor ingredients to create the desired end product. Thermal process flavors, on the other hand, develop flavors through a controlled heating process. The changes that take place during the normal cooking process are accurately controlled to obtain the desired flavor response. The basic components of protein, lipids, and carbohydrates, along with some trace elements, are subjected to precise heating and other environmental conditions to form a flavor profile that can be used to supply a savory flavor. Some of these flavors take advantage of the Maillard reaction, which combines a protein source with a carbohydrate source to create various savory flavors. When the amino acid glycine is combined with xylose, the resulting flavor is characterized as roast beef. Because the Maillard reaction is difficult to achieve under conditions of high humidity, the ability to add a process flavor gives the desired flavor outcome. Cooking cues such as roasted, baked, or fried can be developed through this method.

Taste With Functionality

Natural ingredients—for the purpose of extending shelf life, enhancing food safety, or creating visual appeal—have become a necessity for food providers. Rosemary extracts, carnosol, and carnosic acid are being used for their ability to reduce oxidation in meat products. Green leafy vegetables, such as celery and Swiss chard, are high in nitrate that is fermented to create nitrite that is then added for its curing ability. Turmeric, safflower, and paprika are well known for their ability to impart color.

Spices have a deep, rich history in the formation of kingdoms and civilizations. They are easily taken for granted today because they are so easily accessible. Flavoring can assist processors in the development of flavors that are not easily obtained during modern process conditions of time, temperature, and humidity. To obtain the flavor and appearance profile, the right combination of available ingredients is required.

Seasoning Creation

The development of a seasoning blend is often more than just the combination of herbs and spices.

Carriers are used for the inclusion of oil-soluble liquid ingredients. Ingredients normally used as carriers are salt and maltodextrin. The liquid ingredient is plated onto the carrier, which can then be blended with the other dry ingredients. Fillers such as maltodextrin will be used to help with the distribution of the blend into the meat block during processing. Ingredients that provide basic taste, such as salt, sugar, and citric acids, are likely part of the blend. Some blends will have ingredients that impart color or particulates that provide the traditional appearance of the product that is being made. Commodities such as enzyme-modified cheese powders may be added to achieve the desired flavor. Processing aids, such as silicon dioxide, are often added to maintain the flow properties of the blend, or oil is added to reduce dustiness. Flavors are often added to impart a cooking cue, such as roasted or fried, that cannot be developed under certain process conditions. The right combination of ingredients in a seasoning blend will help achieve the target product.

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