



## **4. FOOD SAFETY SINCE SPICES & CULINARY HERBS PRODUCTION UNTIL THEIR CONSUMPTION**

### 4.1. BIOLOGICAL CONTAMINANTS

### 4.2. CHEMICAL CONTAMINANTS

### 4.3. FOOD SAFETY AND QUALITY MANAGEMENT SYSTEMS

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Spices and herbs are natural products or their blends that must be free of extraneous matter content. Conventional production of these products implicates a number of hygienic problems so spices and herbs may be exposed to a wide range of microbial contamination during pre- and post-harvest and they can present high microbial counts.

Spices are cultivated in various areas of the world, mainly in tropical countries. These differences and the production conditions in the cultivation areas may cause severe problems, which lead to an increased number of food-borne infections and intoxications. This fact may also affect food quality. The collection and manipulation of spices is not always performed under rigorous hygienic conditions, which can lead to high microbial counts and the consequent damage to the food in which they are used. The presence of high levels of these microorganisms is unacceptable in ready-to-eat foods such as fresh and dry herbs, and these products may contain a high number of microorganisms, including pathogenic bacteria, mold and yeast, and, if they are not subjected to proper treatment may cause rapid deterioration of the food. Spices can be recognized as the primary sources of alimentary intoxication when added to foods in which pathogen growth is favorable. The possibility of pathogen

growth is higher when spices are used in foods that have not been subjected to complete thermal treatment, therefore particular attention needs to be paid to the application of spices to ready-to-eat foods which are not subjected to further heat treatments. Control processes based on steam or dry heat treatments to minimize the risk from pathogens must be applied by spice and herb suppliers. The control of microbial contamination in these products lies in the application of good hygiene practices in the production/harvesting area, processing and personnel. During the last decade of the 20th century, food-borne infections and intoxications due to spices have increased in several European countries. There are not microbiological standards for dried spices and herbs in European Community legislation, however, the Codex Code of Hygienic Practice specifies that dried spices and herbs should be free from pathogenic microorganisms at levels that may represent a hazard to health and further requires that *Salmonella* should be absent in treated ready-to-eat spices. The European Spice Association (ESA) also specified that *Salmonella* should be absent in 25 g of spice, *Escherichia coli* to be present at less than 102 ucf/g, and other bacteria requirements to be agreed between buyer and seller.

## 4.1 BIOLOGICAL CONTAMINANTS

Spices and herbs can be an important vehicle for microbiological hazards, especially because they are often added to foods with minimal processing immediately prior to consumption. Several microorganisms detected in spices and herbs have the potential to cause human illness, including aflatoxin-producing fungi (ex. *Aspergillus* spp.), *Bacillus cereus*, *Clostridium perfringens*, *Escherichia coli*, *Salmonella* spp., *Listeria monocytogenes* and *Staphylococcus aureus*. The ability of *Salmonella* to survive to drying treatments and during storage in low water activity food ingredients increases the risk of infection. However, the most common foodborne pathogens contaminating dried spices and herbs are *B. cereus* and *Cl. perfringens*.

Toxigenic moulds, including *Aspergillus flavus* and *Aspergillus parasiticus*, also represent a microbiological hazard for the production of aflatoxins that are carcinogenic, teratogenic, genotoxic and mutagenic.

Steps need to be taken at every step throughout the process of growing, harvesting, drying, processing and storing to ensure that clean, safe spices and herbs are delivered to the consumer. For instance, the water content in the samples increases the possibilities of microbial growth, some factors like humidity can determine changes of survival or proliferation of microbial food contaminants.

Microbial contamination of herbs and spices is dependent of:

- production and cultivation conditions
- geographic region
- variety and age of the plant
- drying method and technology
- antibacterial effect of some spices and herbs, such as basil, thyme and oregano
- packaging material and sterilization
- storage conditions

You can't always tell by the package where a spice originated and what its production conditions were. But here are two steps you can take to cut your risk.

- Add spices before cooking when possible. Any bacteria are likely to be killed by the high heat.
- If you're using seasonings in a dish that's prepared cold, such as cilantro or basil, consider buying fresh herbs. But wash them carefully in running water first: Even organic herbs can harbor bacteria such as *E. coli* and *cyclospora* that could make you sick.

#### **4.2. CHEMICAL CONTAMINANTS**

The Food and Drug Administration issued a worrisome report that stated that 12 percent of imported dried spices contained "filth" such as insect fragments and rodent hairs. The presence of filth was attributed to unsanitary storage conditions and inadequate oversight of suppliers. Signs of poor sanitation and health hazards include not only such items as stones, stems, and foreign seeds, but also insects, excreta, mold, bacteria, hair, and illegal chemicals.

Herbs and particularly spices have always been valuable commodities and are therefore often subject to adulterations. As quality parameters of different spices (e.g., paprika, chilli or saffron) focus primarily on colour and flavour, the analysis of chemical contaminations of spices and herbs is an important issue in terms of preventive consumer protection. Chemical dyes are sometimes added to spices to intensify and maintain its colouring over time, although this kind of adulteration is not allowed and in some cases has also relevance for consumers' health. Besides, chemical residues from pesticides are also of concern and were detected in spices and herbs in the past.

### 4.3. FOOD SAFETY AND QUALITY MANAGEMENT SYSTEMS

Spices are dried plant products used to enhance the flavor of foods. Their safety and wholesomeness are of most concern to the spice industry, their customers, consumers, and regulators. As with any agricultural product, safety, quality, and consistency of a spice product may be compromised by one or all of the many processes it undergoes between the farm and table.

To minimize the potential for contamination of spices and herbs, there are a number of Good Agricultural Practices and Guidelines for handling and storage of these products:

- Good manufacturing practices: processing of spices, facility construction and design, maintenance of the grounds, equipment design, pest control...). This guide focuses specifically on the spice manufacturing environment, and combines recommendations and best practices
- HACCP plan: a key analytical tool to allow the identification of physical, chemical and microbial risks to food safety and steps to prevent them
- Microbial reduction techniques: to assure spices and herbs are free from pathogens
- Supply chain management

HACCP (Hazard Analysis Critical Control Points) is an analytical tool that enables management to introduce and maintain a cost-effective, ongoing food safety program. The ASTA HACCP Guide to Spices and Seasonings has been updated and new tools have been added as companies begin to prepare for the implementation of the Food Safety Modernization Act (FSMA) and the expansion of HACCP to include preventive controls.

Also, in response to concerns raised following several recalls of spices due to *Salmonella*, the American Spice Trade Association (ASTA) has developed guidance for the industry on pathogens in spice. The guidance includes five key recommendations:

1. Minimize the risk for introduction of filth throughout the supply chain
2. Prevent environmental contamination, cross-contamination, and post-processing contamination during processing and storage
3. Use validated microbial reduction techniques
4. Perform post-treatment testing to verify a safe product
5. Test to verify a clean and wholesome manufacturing environment

## References

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