

# **Sterilization of Botanical Herbs**

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Both wildcrafted and cultivated sources of herbs are subject to microbial exposure. The environment in which the herbs are grown, harvesting, handling, drying, storage and transportation practices affect the amount and type of microbial load in herbs. Some such microbes could be pathogenic and potentially unsafe for human consumption.

Good agricultural and collection practices in every phase of the growing, harvesting and handling phases can minimize the microbial load. However, a majority of the herbs are grown and harvested in underdeveloped countries where hygiene facilities are not adequate. Hence, in order to make them safe and suitable for human consumption, herbs often require some form of sterilization. The most commonly used forms of sterilization are ethylene oxide and irradiation.

Treatment with ethylene oxide involves placing the dried herb in an airtight chamber, introducing ethylene oxide gas, heating the chamber to about 180°F for several hours, evacuating the gas and allowing the herbs to de-gas for another 24 hours. When herbs are treated in such a manner, they are left with a residue of ethylene oxide along with

byproduct residues of ethylene chlorohydrin and ethylene bromohydrin. The amount of these residues can be measured using appropriate instrumentation and methods.

Ethylene oxide has been found to be very effective in reducing microbial load in dietary supplements. However, it has been identified by California Proposition 65 as being a carcinogen and a reproductive toxin. Due to environmental concerns, its use has been banned throughout Europe. In the United States, treatment of dietary supplements with ethylene oxide is not legal. Unless the gas has been specifically approved for use on certain crops, use of ethylene oxide to treat herbs renders the product adulterated.

Irradiation is the process of exposing the herbal material to a controlled amount of gamma rays. It is very effective in reducing microbial load. However, like ethylene oxide, its use has been banned in Europe. In the United States, manufacturers must abide by strict labeling laws in order to market dietary supplements treated with gamma irradiation. Whether a commodity has been treated with gamma irradiation can be detected using proper instrumentation and methods.

An alternative to ethylene oxide and irradiation is dry steam sterilization. This is a process of treating herbal material and spices with steam at a temperature of around 112°C and under high pressure. About 40 different product-specific parameters are adjusted to achieve maximum microbial load reduction with minimum impact on physical and chemical properties of the herb.

Dry steam sterilization has been found to be as effective as ethylene oxide and irradiation in reducing microbial load. Unlike ethylene oxide and irradiation, however, the process does not leave any toxic residue, is

completely natural, is environmentally friendly and does not require any type of label declarations. It is the preferred form of sterilization in Europe and is also a truly organic sterilization process.

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