Investigation of the Yield and Composition of Essential Oils of Culinary Herbs before and after Decontamination

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INTRODUCTION

Herbs and spices are widely used in food industry due to the presence of nutrients and non-nutritive biologically active compounds. Their primary functions are to provide diversified taste, smell and colour to products. Additionally, spices provide preservative, nutritional and health function. Most spices owe their unique flavour character mainly to essential oil content. Essential oils that are mixtures of volatile fragrant compounds are used as natural antioxidants as well as antimicrobial agents against food-borne pathogens and food spoilage bacteria. Fresh and dried spices are contaminated by microorganisms that should be removed before introducing them to food products in order to ensure their safety and prolong shelf life. Sterilization, including steam sterilization, is the common method used for spices decontamination. The aim of the study was to evaluate the effect of steam sterilization on the amount and composition of essential oil of two common leaf spices, mint and sage.

EXPERIMENTAL METHODS

Herbal samples of commercial Menthae folium (*Mentha x piperita* L.) and Salviae folium (*Salvia officinalis* L.) were sterilized in paper bags in autoclave (121 °C, 0.1 MPa, 15 minutes). Essential oils from spices before and after sterilization were isolated by hydrodistillation in Clevenger-type glass apparatus. The composition of essential oils was investigated using gas chromatography-mass spectrometry (GC-MS). Statistical analysis (mean values ± standard deviations, analysis of variance) was undertaken using the Origin 6.1.

RESULTS AND DISCUSSION

Steam sterilization appeared to be very efficient method in spice decontamination. Significant diminishing of spoilage microorganisms in both herbs was observed – the degree of reduction of *Bacillus* spores and fungi was 2-3 cycles log. The amount of essential oil after stem sterilization was significantly lower than in raw herbs and was 0.48% vs. 0.90% for mint and 0.24% vs. 0.86% for sage. Small differences were observed in mint oil composition before and after decontamination. The main constituent were: menthone (32.7 and 20.4%), menthol (39.4 and 33.8%); and menthyl acetate (14.6 and 13.4%, respectively). Considerable changes were noticed for sage oil. Content of main constituents diminished, e.g. camphor (29.4 and 4.3%), α-thujone (15.4 and 6.3%), and borneol (7.4 and 5.8% before and after sterilization, respectively). In both oils the main losses were observed in monoterpene hydrocarbons content. New constituents were present that constituted ca. 4% in mint oil and ca. 35% in sage oil.

CONCLUSIONS

The steam treatment was effective in diminishing microbial contamination of culinary spices. However, the decontamination process in the conditions applied in the research brought to lowering essential oil content and caused changes in oil composition.