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Exploring the impact of roasting conditions on hazelnut quality by GC-IMS and sensory analysis

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Summary: *This study used SHS-GC-IMS to analyze hazelnut paste from different origins, examining the effects of roasting conditions and storage time on VOCs. It demonstrated the technique's efficacy in monitoring roasting by correlating VOCs with sensory data, color, roasting profiles, and moisture content.*

Keywords: *hazelnut, roasting, VOCs, sensory, SHS-GC-IMS*

Introduction

Hazelnuts (*Corylus avellana* L.) are of significant industrial importance, particularly in the form of processed products derived from roasted kernels. The unique flavor developed during roasting is a key driver of hazelnut consumption and their use in confectionery products. The sensory quality of roasted hazelnuts is largely determined by their volatile organic compounds (VOCs), which can be influenced by factors such as the geographical and botanical origin of the kernels, as well as technological processes like storage and roasting conditions. Gas Chromatography coupled with Ion Mobility Spectrometry (GC-IMS) is an increasingly popular analytical technique for food flavor analysis. Utilizing static headspace (SHS) sampling, SHS-GC-IMS requires minimal sample preparation, eliminates preconcentration steps, and offers relatively short analysis times. This makes SHS-GC-IMS a promising and rapid analytical tool, especially for applications where simplified protocols are advantageous.

Results

In this study, SHS-GC-IMS was used to characterize hazelnut paste samples from two different geographical and botanical origins. The research examined the impact of various roasting conditions and the storage time of raw kernels. A targeted approach was employed to monitor key odorants and roasting conditions, while an untargeted strategy, based on an automated peak detection workflow, provided insights into the complex nature of the volatilome of roasted hazelnuts. The VOC datasets were analyzed and correlated with sensory data from a panel trained in hazelnut evaluation, as well as with other measured parameters such as color, roasting temperature profile, and moisture content.

Conclusions

This research demonstrates the feasibility of using SHS-GC-IMS for efficient monitoring of industrial hazelnut roasting by integrating color assessment, roasting profiles, sensory evaluation, and VOC analysis.

References

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