

Instytut Biotechnologii Przemysłu Rolno-Spożywczego
im. prof. Wacława Dąbrowskiego – Państwowy Instytut Badawczy

mgr inż. Joanna Kanabus

**Wpływ modelowych procesów przetwórczych
stosowanych w technologii żywności
na stabilność i profil kannabinoidów oraz terpenów
z *Cannabis sativa* L. var. *sativa***

Effect of model processing used in food technology on the stability and profile
of cannabinoids and terpenes from *Cannabis sativa* L. var. *sativa*

Praca doktorska
Doctoral thesis

Promotor:

dr hab. inż. Marek Łukasz Roszko, prof. IBPRS-PIB
Instytut Biotechnologii Przemysłu Rolno-Spożywczego
im. prof. Wacława Dąbrowskiego – Państwowy Instytut Badawczy
Zakład Bezpieczeństwa i Analizy Chemicznej Żywności

Recenzenci:

dr hab. inż. Rafał Wołosiaś, prof. SGGW
Szkoła Główna Gospodarstwa Wiejskiego w Warszawie
Instytut Nauk o Żywności/Katedra Technologii i Oceny Żywności
Zakład Oceny Jakości Żywności

dr hab. inż. Alicja Sułek
Instytut Uprawy Nawożenia i Gleboznawstwa - Państwowy Instytut Badawczy
Zakład Uprawy Roślin Zbożowych

dr hab. inż. Andrzej Baryga, prof. PŁ
Politechnika Łódzka
Katedra Cukrownictwa i Zarządzania Bezpieczeństwem Żywności

Warszawa, styczeń 2025

Abstract

Effect of model processing used in food technology on the stability and profile of cannabinoids and terpenes from *Cannabis sativa* L. var. *sativa*

Cannabis sativa L. var. *sativa* plants are characterised by their unique bioactive compounds (cannabinoids and terpenes) and can be a component of the human diet. Cannabinoids are characterised by proven health-promoting effects and the co-present terpenes support the action of these compounds. There are health risks associated with the presence of the psychoactive compound Δ^9 -THC, which may be present in cannabis-containing foods. Inadequately prepared products or uncontrolled storage conditions of foods made with hemp can contribute to the presence of this compound in the product for consumption. In this study, a method was developed to determine cannabinoids in fresh and dried plant parts (inflorescences of different sizes, leaves) and hemp seeds. Liquid chromatography and gas chromatography techniques coupled with mass spectrometry were used for the work. To determine the potential changes resulting from different drying conditions of the plant, an experiment was conducted using three drying methods (ambient temperature, freeze-drying, and convection drying at three temperature variants of 50, 60, and 70°C). Cannabis inflorescences and leaves were dried. The study evaluated the degree of change in the content of total and individual cannabinoids and terpenes during and after drying. An assessment of the stability of the analysed compounds under model conditions of fermented food production and confectionery manufacture was carried out. The effect of the fermentation process on the stability of cannabinoids in fermented milk drinks containing 0.5-2% hemp additives (freeze-dried hemp, hemp oil, and hemp ethanol extract) was investigated. The effect of baking conditions on the stability of cannabinoids and terpenes in shortcakes containing 1-3% hemp input in freeze-dried hemp was also examined. The results showed that drying conditions affect the final content and profile of the analysed compounds and that the use of higher drying temperatures contributes to increased cannabinoid degradation. The effect of the fermentation process on cannabinoid stability was shown to depend on the type of hemp input used. The baking conditions of bakery products influence the final content of these compounds. The key factors determining the stability of cannabinoids and terpenes in the finished product are the conditions of the preparation process of the hemp feedstock and the form in which it is introduced into the product.

Keywords: cannabinoids, terpenes, drying, fermentation, baking

Kamela Youssef