

Abstract

Seeds of *Salvia hispanica* L., also known as chia, are a source of nutritionally valuable oil, rich in polyunsaturated fatty acids (with a predominance of α -linolenic acid) and lipophilic unsaponifiable compounds, including polyphenols. Unfortunately, literature data focused on composition of chia seed oil and its storage stability is incomplete and inconsistent. The main reason that may cause these differences can be the raw material (mainly the cultivation area) and the technological factors related with the method of oil extraction.

The experimental part is designed as three stages. The main objective of the research was to determine the effect of various oil production methods (various solvents in percolative extraction in Soxhlet apparatus, different temperatures of seeds during pressing in a screw press and variable temperature during SFE with CO₂ – 1st stage; variable extraction time and addition of modifier during SFE with CO₂ – 2nd stage) on the extraction of important nutritional components (sterols, squalene, tocopherols, carotenoids, polyphenols) and storage stability of chia seed oils. An additional aim of the study was to determine the impact of raw material variability on the qualitative and quantitative characteristics of obtained oils, indicators of their quality and storage stability (3rd stage). Analyses carried out in the 1st stage showed that the most oxidative stable oil was sample obtained during the Soxhlet extraction with acetone. This solvent was used in 2nd stage as a CO₂ modifier in the SFE process. In addition to the quantity of modifier, the influence of the SFE duration on obtained oil composition was also studied. The results of this stage confirmed that extending the extraction and the use of acetone as a modifier allows to increase total lipid recovery, this oil is also the most abundant in phenolic compounds and carotenoids. Samples obtained by shorter extraction had the higher concentration of non-polar phytochemicals (sterols, tocopherols, squalene). 3rd stage assessed the amount, composition and quality of the oil from 15 chia seeds batches (from 5 countries) available on the market in Poland. Large differences were found in terms of the quality values of oils, stability and bioactive compounds concentration (e.g. tocopherols, squalene, phenolic compounds).