

PHYTOSTEROL COMPOSITION OF SELECTED NUTS AND SEEDS FROM THE SERBIAN MARKET

Ivana Sofrenić¹, Jovana Ljujić¹, Katarina Simić², Jelena Kukić-Marković³, Nevena Ivanović⁴, Margarita Dodevska⁵

¹University of Belgrade – Faculty of Chemistry, Belgrade, Serbia, ²University of Belgrade – Institute of Chemistry, Technology and Metallurgy, Belgrade, Serbia, ³Department of Pharmacognosy, University of Belgrade – Faculty of Pharmacy, Belgrade, Serbia, ⁴Department of Bromatology, University of Belgrade – Faculty of Pharmacy, Belgrade, Serbia, ⁵Institute of Public Health of Serbia „Dr Milan Jovanović Batut“, Center for Hygiene and Human Ecology, Belgrade, Serbia

Introduction

Edible nuts and seeds are nutrient-rich food, and also valuable source of various bioactive compounds. Among them are phytosterols, plant triterpenes with proven antioxidant, anti-inflammatory and antibacterial properties. Due to their similar structure with cholesterol, these plant sterols, when digested, compete with cholesterol for small intestine absorption leading to lowering of the cholesterol level in blood.

Objectives

The aim of this work is to investigate phytosterol composition of selected nuts and seeds used in nutrition from the Serbian market.

Methods / Design

25 different samples of nuts and seeds were obtained from a local store (almond, Brazil nut, cashew, hazelnut, pecan, peanut, pine nut, pistachio, walnut, chia seed, hemp seed, flax seed, sesame, sunflower seed; Figure 1). Each sample was homogenized and fatty oil was extracted by cold extraction using light petroleum. Obtained oils were then subjected to alkaline hydrolysis at 90°C during 1 hour. Sterols were extracted three times with light petroleum, and evaporated till dryness. Silanization of obtained samples was performed using BFSTA (bis-(trimethylsilyl)-trifluoroacetamide).

Obtained unsaponifiable fractions were analysed as follows: gas chromatography with flame ionization detector (GC-FID) and gas chromatography with mass spectrometry (GC-MS) analysis was performed on an Agilent 7890A GC equipped with 5975C (inert XL EI/CI) MSD and a FID detector connected by a capillary flow technology two way splitter with make-up (250 °C). A HP-5MS capillary column (Agilent, 30 m × 0.25 mm, 0.25 µm film thickness) was used. The identification of the compounds was based on the comparison of their retention indices (RI), Rt, and mass spectra from NIST/NBS 05, Wiley libraries 8th edition and NIST Chemistry WebBook.29.



Results

Phytosterols were analyzed as volatile derivatives obtained by the silanisation of residual unsaponifiable fractions after alkaline hydrolysis. Cholesterol standard was used for quantification. The most abundant phytosterol in investigated nut and seed samples was β -sitosterol, followed by stigmasterol, isofucosterol and campesterol (Figure 1).

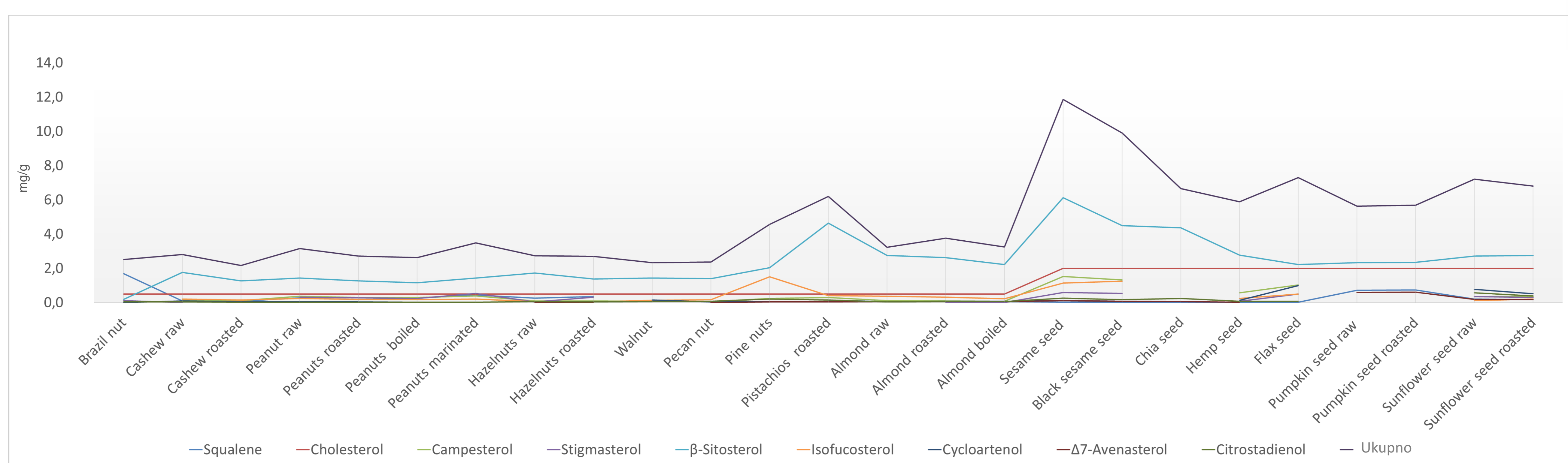


Figure 1. Phytosterol content of selected nuts and seeds

Conclusion

Our results indicate that the seeds (sesame, black sesame, flax seed, chia seed) contain higher amount of phytosterols in comparison to the nuts. Obtained results were in correlation with literature data, thus confirming that quality of selected nuts and seeds on Serbian market is appropriate according to phytosterols content.