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THE BARRIER BETWEEN TOXIC AND NUTRITIOUS SEEDS

Despina-Maria Bordean1, Ducu Sandu Stef, Aurica Breica Borozan2, Liana Maria Alda1, Luminita Pirvulescu3, Laura Rădulescu1, Corina Iuliana Megyesi1

1 Faculty of Food Engineering, 2 Faculty of Engineering and Applied Technologies, 3 Faculty of Management and Rural Tourism

University of Life Sciences „King Mihai I" from Timișoara, 119 Calea Aradului, 300645 Timisoara, Romania;

Corresponding authors*: laura_corpas@yahoo.com; pirvulescu_l@yahoo.com

Abstract:

Over the last decade, chia, quinoa, hemp and flax seeds were considered as remarkably healthy food, due to a variety of beneficial compounds, such as antioxidants and anti-inflammatory agents, phytoestrogens and phytosterols with positive impact on hormonal health. But what happens if these seeds are also rich in heavy metals, like cadmium and /or arsenic, metals which are notorious for producing different forms of cancers, osteoporosis, kidney, heart and brain disorders? What if these plants have the capacity to accumulate heavy metals? What if some of these plants are recommended for phytoremediation of contaminated soils? Do we still consume or avoid them?

• Introduction

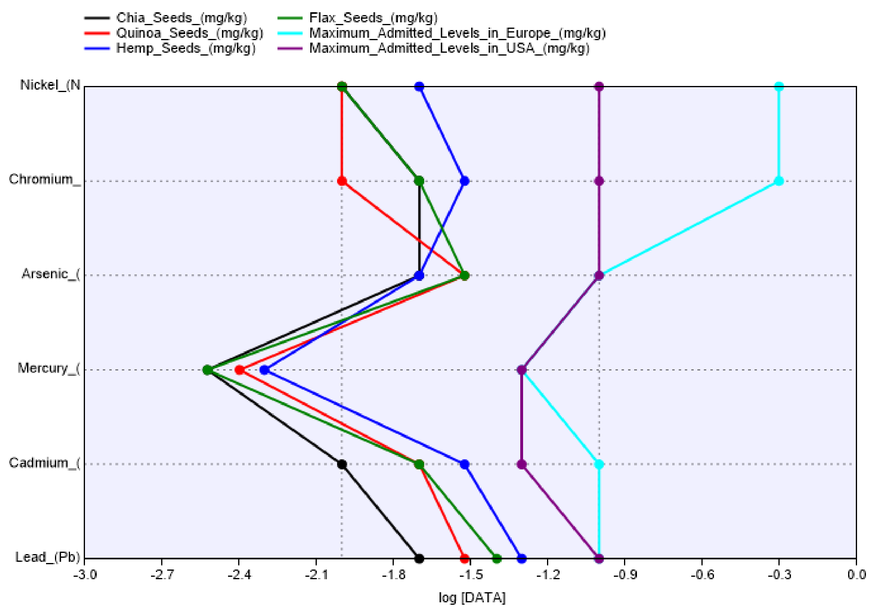
Chia, quinoa, hemp, and flax seeds are all highly nutritious seeds that are rich in a variety of nutrients, including protein, fiber, healthy fats, vitamins, and minerals. The present study was performed on the mentioned seeds and illustrates the fine barrier between healthy and poisonous foods based on their heavy metals content.

• Material and method

The seeds (chia, quinoa, hemp and flax seeds) samples were analyzed using X-ray fluorescence (XRF), an analytical technique used to determine the elemental composition of a sample. It operates based on the principle of X-ray excitation and subsequent emission of characteristic X-rays from the sample. All results were compared with the results presented by different scientific articles and /or data bases registered values

• Results and discussions

The obtained heavy metals concentrations distributed in table form and compared to the maximum admitted levels in EU and USA as well as the applied mathematical models show that the studied seeds can accumulate high content of heavy metals. The heavy metal contamination can occur in the seeds due to various factors, including environmental pollution, agricultural practices, and processing methods.



• Conclusions

Based on the analysis of the data, the seeds that show a relatively higher risk of contamination appears to be hemp seeds which accumulate higher concentrations of certain heavy metals compared to chia seeds, quinoa seeds, and flax seeds. Specifically, hemp seeds have higher average concentrations of lead (Pb), cadmium (Cd), chromium (Cr), and nickel (Ni) compared to the other seed types. However, the extent of heavy metal accumulation can vary depending on several factors, like growing conditions, soil quality, agricultural practices, geographical region and the environmental conditions in which they are cultivated.