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Characterization of food from burnt areas in the Central Region of Portugal

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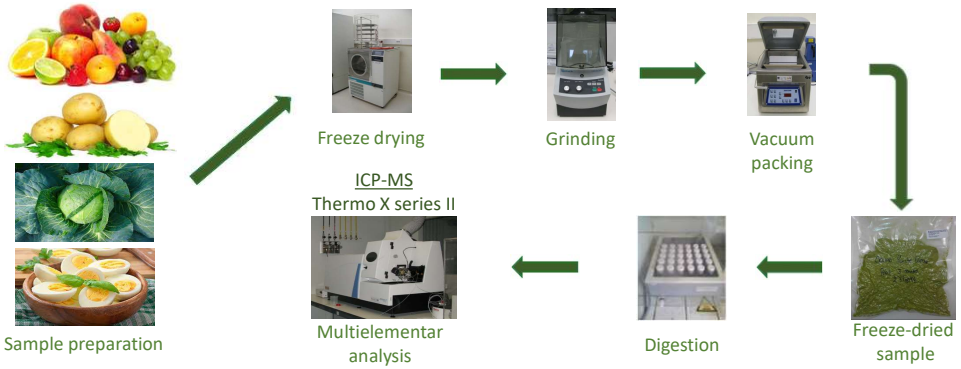
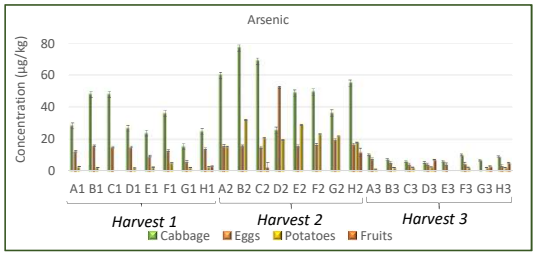
INTRODUCTION: Forest fires constitute an environmental problem with adverse and diversified impacts on atmospheric, terrestrial, and aquatic ecosystems, with economic and social repercussions, and a significant impact on flora. Fire mineralizes soil nutrients and returns plant-locked nutrients to the soil. Nutrients are lost from the ecosystem through the release of particulates and volatile compounds during the fire, and later through surface transport and leaching by rains[1]. Wildfires can play an important role in the environmental distribution of major and trace elements, including through their mobilization by fire-induced runoff and associated transport of soil and ash particles. Also, wildfires have been found to release and deposit contaminants on the soil surface, either directly by combustion of vegetation and mineralization of soil organic matter or indirectly through interactions of ashes. This fact can lead to the addition of potentially significant amounts of these elements in the soil and, thereby, can alter its chemical properties[2].

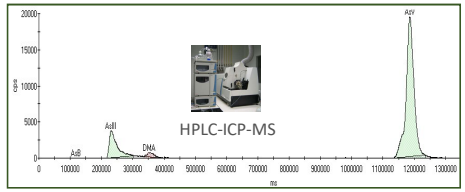
AIM: This study aims to evaluate the content of arsenic (As), cadmium (Cd) and chromium (Cr) in cabbage, potatoes, eggs and fruit samples cultivated in recently burnt areas.

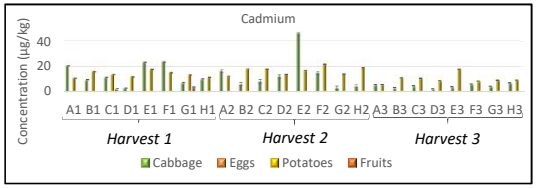
MATERIAL AND METHODS: A total of 24 pools composed of 3 samples each was analysed at three different harvest periods. Cabbage samples from burnt zones were compared with a designated control sample from a non-burnt zone. Analytical determinations were performed by Inductive Plasma Coupled Mass Spectrometry (ICP-MS). Previously, samples underwent a heating block acid digestion with a validated time and temperature program. Speciation analysis was carried out by High Performance Liquid Chromatography (HPLC) coupled to ICP-MS. Before analysis, samples were extracted using nitric acid. Analyses were performed in accordance with ISO 17025:2005.

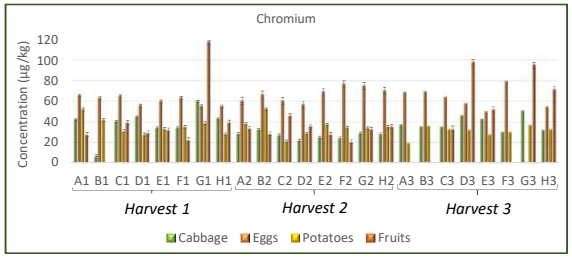


RESULTS: The concentrations of As in fruits and Cd in eggs were below the limit of quantification (2.2 µg/kg and 3.1 µg/kg, respectively). The variation of Cr content between matrices was as follows: fruits > eggs > cabbages > potatoes. On the other hand, As contents was verified as: cabbage > eggs > potatoes > fruit. Cabbage presented the highest Cd content, while eggs had the lowest values for this element. When compared to the control sample, the most pronounced rise was observed for As. Speciation studies show that the predominant arsenic species in cabbages are also the most toxic ones, that is, arsenite (As (III)) and arsenate (As (V)).









CONCLUSIONS: The values of the inorganic elements present in this study are not yet properly legislated so it is important to performed studies able to support future legal references. Monitoring studies based on accredited methods are a powerful aid in assessing the risk exposure of affected populations.

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