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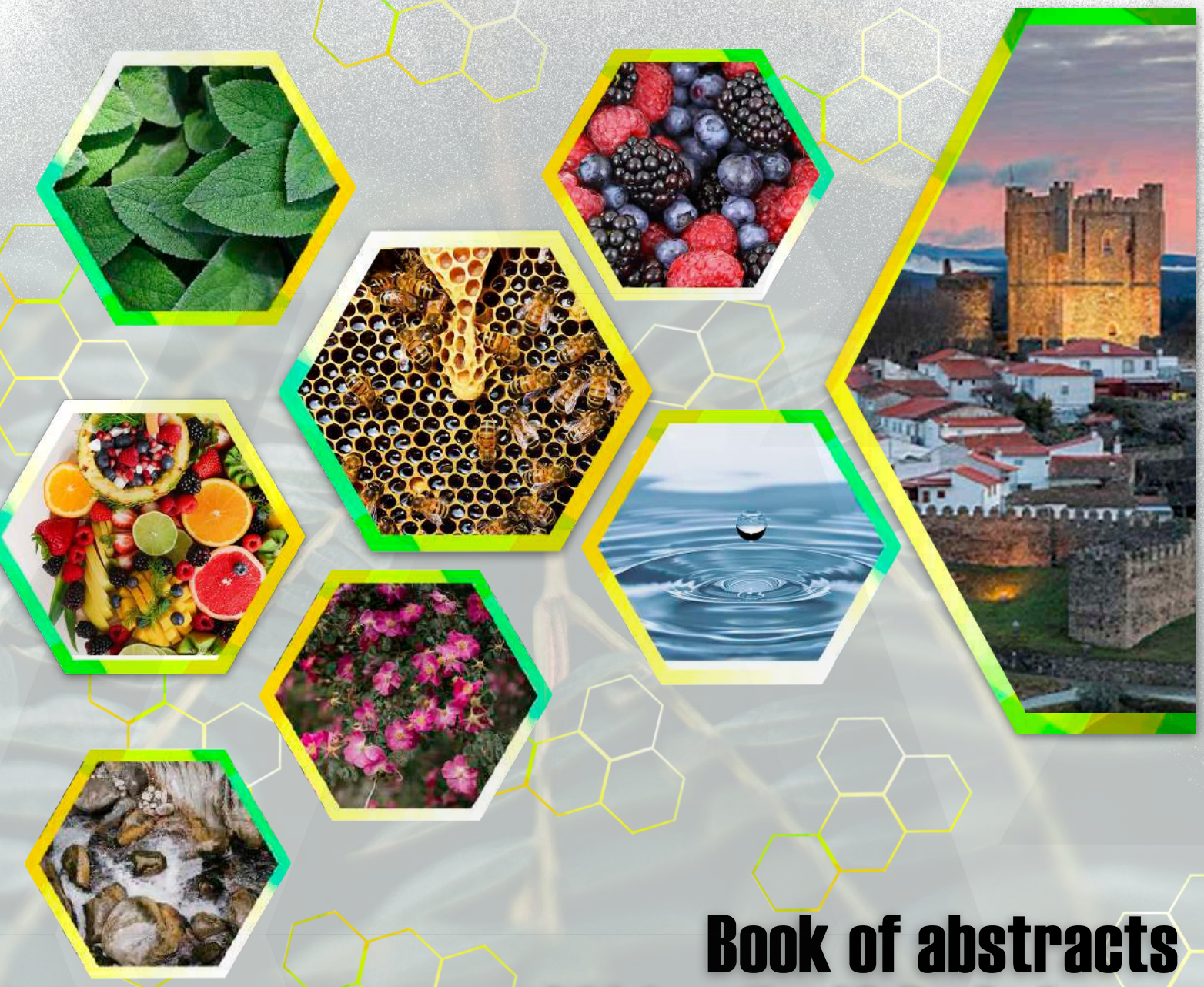

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OPTIMIZATION AND RECOVERY OF VITAMIN D_2 FROM SURPLUS PRODUCTION OF *AGARICUS BISPORUS* PORTOBELLO

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During mushroom production a percentage as high as 20% of surplus can be generated. These unused mushrooms have high nutritional value and valuable chemical compounds. In this sense, finding innovative alternatives to valorizing this surplus mushroom production needs to be explored [1,2]. Irradiation of mushrooms surplus to obtain vitamin D_2 is a sustainable strategy to increment vitamin D availability.
Under this perspective, the objective of this study was setting the UV-C irradiation and extraction conditions that maximize vitamin D_2 contents in surplus mushrooms production (*Agaricus bisporus* Portobello). The bioactive effects and potential toxicity of vitamin D_2-enriched extracts were also evaluated. The surplus production from *A. bisporus* Portobello were supplied by the Ponto Agrícola, Baião, North of Portugal. The irradiation was performed using an ultraviolet (UV-C at 200 mJ/cm^2, 800 mJ/cm^2 and 3200 mJ/cm^2) radiation chamber with different exposure times: 0, 2, 6 and 10 min. Sensitivity and linearity of the high performance liquid chromatography (HPLC) coupled to ultraviolet detector (UV) were determined and the method was validated by the instrumental precision, repeatability and accuracy, and the extracts rich in vitamin D_2 were also quantified by HPLC-UV. The cytotoxicity of the vitamin D_2 extract were evaluated using three tumoral cell lines (MCF-7 - breast adenocarcinoma, NCI-H460 - non-small cell lung cancer and AGS - gastric cancer) and one non-tumoral cell line of bone origin (h-FOB 1.19 - human osteoblasts).
The chromatographic method revealed a great reproducibility and accuracy, thus being the method validated. Independently of the UV-C irradiation dose, the effect in the conversion of vitamin D_2 concentration was very high, allowing it to increase from ~3 µg/g dw to more than 100 µg/g dw in *A. bisporus* portobello. The extract enriched in vitamin D_2 presented an effective activity in AGS (82 µg/mL) tumoral cell line and a moderate activity in NCI-H460 (293 µg/mL) and CaCo (377 µg/mL) tumoral cell lines. Furthermore, the extract did not show cytotoxicity against the non-tumor bone cell h-FOB 1.19 (GI_{50}> 400 µg/mL). Accordingly, development food applications of mushroom extracts enriched in vitamin D_2, from surplus mushroom production, can be considered and valorized, supporting and adding value to the agriculture sector or pharmaceutical industries.

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