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Food and Health - Risks and Benefits

Book of Abstracts

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Physical hurdles to enhance watercress' quality and safety: Effects on chemical and bioactive parameters

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The hurdle concept provides a framework for combining a number of milder preservation factors (hurdles) in order to achieve an enhanced level of product safety and stability. For fresh vegetables such as watercress (*Nasturtium officinale* R. Br.), characterised by a reduced shelf-life, some of these hurdle have focused on the use of modified atmosphere packaging (MAP) combined with other physical or physicochemical factors (Alexandre et al., 2011; Silveira et al., 2014). Thus, in the present work, the combined effects of passive MAP, gamma irradiation and refrigerated storage on chemical and bioactive quality parameters of watercress were evaluated. Wild specimens were gathered in the Northeast region of Portugal, rinsed in tap water and a portion was immediately analysed (control). The remaining fresh material was packed under passive MAP, exposed to 1, 2 and 5 kGy of γ-rays in a ^{60}Co chamber and stored at 4 °C for 7 days. Non-irradiated samples followed all the assays. Sugars, fatty acids, tocopherols and organic acids were analysed by chromatographic techniques. Phenolics and flavonoids were determined by spectrophotometer methods. The antioxidant activity was evaluated in hydroalcoholic extracts using four distinct *in vitro* assays. In general, the sucrose and organic acid levels increased in stored samples. The 5 kGy dose protected MUFA (monounsaturated fatty acids), while the 2 kGy dose was effective in favouring PUFA (polyunsaturated fatty acids). In either case, the hurdle treatment allowed obtaining watercress samples with a healthier fatty acids profile, as also verified in the increased PUFA/SFA (saturated fatty acids) ratio. Concerning tocopherols, the most relevant result was the effect achieved with the 5 kGy dose, particularly owing the contributions of α- (the major isoform) and γ-tocopherols. The same dose also allowed the best results in maintaining the antioxidant activity, as well as in phenolics and flavonoids. Through Linear Discriminant Analysis it was concluded that 2 kGy is the preferable hurdle to maintain the original characteristics of watercress. Nevertheless, the 5 kGy dose should also be considered when aiming to obtain a final product with healthier properties. Thus, this study highlighted the suitability of the applied hurdles to enhance watercress functionality and shelf-life.

Keywords: watercress, hurdle technology, passive MAP, gamma irradiation, chemical composition, bioactivity

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