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EFFECTS OF FREEZING, DRYING AND STORAGE PERIOD ON BIOACTIVE PROPERTIES OF ROCKET LEAVES, SPINACH AND WATERCRESS BY-PRODUCTS

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Green leafy vegetables are rich sources of bioactive metabolites, holding a high antioxidant potential and health-associated benefits in chronic, cardiovascular, neurological and some cancer diseases. The transformation of by-products from these industries into ingredients with a long shelf-life is an opportunity to reduce food losses and develop added-value products.

In this study, the impact on the bioactive properties of two processing approaches (pulps development and freezing as well as hot air drying and vacuum storage) in rocket leaves, spinach and watercress by-products were evaluated for 6 months. After washing and sodium hypochlorite disinfection, the microbial counts of all by-products significantly decreased, with no significant variations during both processing approaches and storages. The results suggested that total phenolic compounds (TPC), antioxidant capacity (ABTS, ORAC and DPPH) and carotenoid content significantly increased in the first months of freezing, but after this period decreased. In some cases, these values were higher in the final freezing period compared to fresh by-products. Although no key variations were registered during drying storage, a negative impact was registered compared to fresh vegetables, except for watercress, where no significant variations in the antioxidant capacity by DPPH method and carotenoids content were verified. α-, β-carotene and lutein were detected in spinach and rocket leaves while in watercress only β-carotene and lutein were identified. The most relevant carotenoid in all vegetables was β-carotene with higher concentrations in rocket leaves and watercress in month 3 (258.54±6.56 and 224.89±17.22 mg/100 g DM, respectively) and spinach in month 4 (231.55±5.92 mg/100 g DM).

Keywords: Rocket leaves; Spinach and watercress; By-products; Total phenolic compounds; Antioxidant capacity; Carotenoids