

## Valorization of non-compliant *Bravo de Esmolfe* Apples and *Saco* Cherries: development of antioxidant extracts

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In the last years, consumption of fruits and vegetables became more interesting because of the beneficial properties associated with the high level of bioactive compounds such as phenolic compounds. The phenolic compounds of apple and cherry have been linked with diverse human health properties namely the prevention of chronic, cardiovascular and cancer diseases, mainly associated with their antioxidant activity. Nowadays, a special interest has increased on the recovery of these compounds from non-compliant fruits, which are fruits that do not have market value and cannot be sold, and therefore, an effort to find value-added for these food losses has been made to comply with circular economy concept. On the other hand, previous results from IBET group showed that traditional Portuguese varieties such as *Bravo de Esmolfe* apple<sup>[1]</sup> and *Saco* cherry<sup>[2]</sup> are powerful antioxidant sources compared with exotic varieties. Furthermore, reventant amounts of apples and cherries are not completely sold because many of them are considered non-compliant fruits although they are still safe and nutritious. In order to obtain bioactive compounds from these fruits, green extraction methodologies and solvents have been widely investigated. With this context, the aim of this work was to develop novel antioxidant extracts through green solvents and methodologies to apply in cosmetics and food products. *Bravo de Esmolfe* apple and *Saco* cherry antioxidant extracts were obtained using non-compliant fruits with water and/or ethanol employing microwave and ultrassound technologies. The content of total phenolic compounds (TPC) was evaluated by Folin-Ciocalteu method, total anthocyanins by pH-differential method and antioxidant activity (AA) evaluated through ABTS<sup>°</sup>, DPPH<sup>°</sup> and ORAC method. Using microwave extraction and the conditions of water:ethanol (50:50 (v/v)) (in the case of cherry with 0,1% HCL), 300W during 15 min it was possible to obtain the highest value of TPC (4,44 g/ g dry extract for apple and 12,5 g/g dry extract for cherry) and AA (ABTS<sup>°</sup>: 3,92 mg/g dry extract for apple and 10 mg/g dry extracts for cherry and DPPH<sup>°</sup>: 5,11 mg/g dry extract and 9,5 mg/g dry extract, respectively) for both fruits. As expected, high positive correlation between TPC and AA (by ABTS<sup>°</sup> method) was observed, associated to the higher antioxidant content. Identification of phenolic compounds by HPLC of the different extracts also reinforced these properties. The results demonstrated that non-compliant *Bravo de Esmolfe* apple and *Saco* cherry are an excellent source of antioxidants and may be valorized with added-value towards applications as natural additives for food and cosmetic products.

**Keywords:** Bravo de Esmolfe Apple, Saco Cherry, Green extracts, Antioxidant activity