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Chemical profile and nutraceutical features of cape gooseberry fruit and fruiting calyx

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The Solanaceae *Physalis peruviana* L. is a South American native plant commonly known as cape gooseberry. Widely spread in the last century, today it is cultivated or grows wild across the world in tropical, subtropical and even temperate regions. A notable feature of this species is the formation of a large, papery husk derived from the calyx, which covers the fruit. The cape gooseberry fruit is mainly consumed fresh but can be transformed into derived products such as jam, sauces, syrups, marmalades, snacks, and beverages.¹ It is also used in folk medicine for the treatment of some diseases and health conditions, as well as its fruiting calyx.¹ Thus, given the increasing use and popularity of this fruit, it is important to go further in its nutritional and phytochemical composition, as well as its bioactive properties. While there is more information about the fruit than about its calyx, this is an important by-product of cape gooseberry processing that deserves further investigation as a source of bioactive compounds.²

This work aimed to characterize the chemical composition and nutraceutical properties of cape gooseberry fruit and its calyx. The fruit was characterized for its proximate composition (moisture, fat, protein, ash, and total dietary fiber; available carbohydrates were calculated by difference) following official methods of food analysis and free sugars, organic acids, fatty acids, and tocopherols were quantified by different chromatographic techniques. Hydroethanolic extracts of fruit and calyx were then prepared by solid/liquid extraction and used to characterize the phenolic profiles by the HPLC-DAD-ESI/MSⁿ technique. Both extracts were also used to evaluate the *in vitro* antioxidant activity, through cell-based lipid peroxidation and oxidative hemolysis inhibition assays, and antimicrobial effects against foodborne bacteria and fungi, using serial microdilution methods.³

The nutritional analysis revealed that the cape gooseberry fruit contains high levels of reducing sugars and dietary fiber. The fat content was relatively low and composed mostly of polyunsaturated fatty acids. Interesting amounts of tocopherols and ascorbic acid were also detected, thus highlighting the nutritional value of this fruit. Regarding the phenolic composition, caffeoyl-hexoside and apigenin derivatives were identified in the fruit extract, while phenolic acids and quercetin-type flavonoids predominated in the calyx extract. The latter showed greater capacity to inhibit lipid peroxidation and oxidative hemolysis than the fruit extract, and it was also more effective against most of the tested foodborne microorganisms. Overall, cape gooseberry proved to be an exotic functional fruit with a balanced nutritional profile and high antioxidant activity. In turn, its fruiting calyx showed potential to be upcycled into bioactive ingredients for food and nutraceutical application, among others.

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