

ORIGINAL ARTICLE

Effect of ulluco starch coating on the preservation of harvested goldenberries (*Physalis peruviana* L.)

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Abstract

This study aimed to determine an alternative to extend the shelf life of goldenberries by using an edible ulluco starch-based coating (USBC). For this purpose, USBCs were prepared at different starch concentrations, namely S1 (2.0% w/v), S2 (2.5% w/v), and S3 (3.0% w/v). Then, ripe goldenberries were divided into four groups and coated with S1, S2, S3, and water as a control thus obtaining the S1G, S2G, and SG3 groups. The coated fruits were stored and analyzed with respect to their physicochemical and microbiological parameters. Results demonstrated that the use of the USBC did not affect sugar and total soluble solids, pH, titratable acidity, and color in the fruits. Moreover, a reduction in respiration rate and water loss as well as an improvement in fruit firmness were observed. Microbiological analysis revealed that the coating delayed the growth of microorganisms by at least one week. The use of ulluco starch for edible coating preparation is a potential alternative for the improvement of the shelf life of goldenberries, and it can be a strategy to add value to the ulluco crop.

Novelty impact statement: This research shows an extension of the shelf life of goldenberries using an edible coating based on ulluco starch. Edible coatings decreased respiration rate and weight loss in goldenberries. The use of ulluco starch can help in meeting the industrial demand for starch as a raw material without compromising on food security.

1 | INTRODUCTION

Physalis peruviana L. is a perennial plant belonging to the Solanaceae family native to South American Andes and is cultivated primarily at altitudes between 1,700 and 2,900 m above sea level (m a.s.l.), particularly in Colombia, Peru, and Ecuador (Bernal et al., 2018; Maruenda et al., 2018). *P. peruviana* fruit, also known as goldenberry or cape gooseberry, is a climacteric edible yellow-orange waxy skin berry with juicy pulp characterized for being protected by a papery husk (calyx) and contains between 150 and 300 small seeds (Fischer et al., 2011). This fruit is recognized as having high nutritional value, the reports in the literature establish protein contents of 2.6%, lipids 0.5%, carbohydrates

19.6%, and crude fiber 4.9% in wet basis, and an energy intake of 76.8 cal (Puente et al., 2011, 2020). Goldenberries, are a valuable source of minerals such as Potassium (467 mg per 100 g of pulp) and Iron (1.24 mg per 100 g of pulp) (Leterme et al., 2006; Puente et al., 2011), and provide a medium to low level of Sodium (6 mg per 100 g of pulp), Calcium (28 mg per 100 g of pulp), Magnesium (19 mg per 100 g of pulp), Phosphorus (55 mg per 100 g of pulp), and Zinc (0.40 mg per 100 g of pulp) (Puente et al., 2011). In addition, the presence of vitamins such as vitamin C, E, B3, and B6; provitamin A; polyphenols, carotenoids, withanolides and physalins A, B, D, and F has been reported in the pulp, and their presence has been linked to promoting consumer health benefits (Etzbach et al., 2018; Olivares-Tenorio et al., 2016; Puente et al., 2011). As a

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