

ORIGINAL
RESEARCHOptimised statistical extraction of anthocyanins from *Arbutus unedo* L. fruits and preliminary supplementation assays in yoghurtYASSINE BENCHIKH,^{*1,2}  SANA SAHLI,² MOUSSA ALLEG,² NASSIMA MOHELLEBI³ and MOHAMMED GAGAOUA⁴ 

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This study aimed to optimise the extraction parameters of anthocyanins from *Arbutus unedo* L. fruits and then perform a new formulation of yoghurt using the extracts as a supplement. Thus, the Box–Behnken model was applied to investigate the effects of agitation speed (600–1000 rotations per minute (rpm)), sample/solvent ratio (1–6 mg/mL) and extraction time (5–25 min) on total anthocyanin content (TAC) and antioxidant activity. The optimal conditions were 770 rpm, 3.59 mg/mL and 15.61 min. The enriched yoghurt with the anthocyanins contained 32.57 µg cyanidin-3-glucoside equivalent/100 g of TAC. The new formulated yoghurt was proposed as a good source of anthocyanins.

Keywords Yoghurt, Antioxidants, Dairy technology, Response surface methodology (RSM), Processing.

INTRODUCTION

Arbutus unedo L. (*A. unedo*) is a perennial shrub and is a native Mediterranean species. As it is adapted to Mediterranean climate, *A. unedo* has the ability to overcome the summer dryness (Alexandre *et al.* 2018). The fruits are spherical shaped berries having a diameter of 2–3 cm and red in colour. Maturity is achieved during autumn, especially in October (Alexandre *et al.* 2020). They are applied in folk medicine as antiseptic, laxative and diuretic agents (Pawlowska *et al.* 2006; Fortalezas *et al.* 2010; Santo *et al.* 2012). However, they are considered as perishable fruits due to the high amount of sugar, and for this reason, they are mostly transformed into more stable food formulations such as jams, marmalades or beverages (Cavaco *et al.* 2007; Fernandes *et al.* 2018; Alexandre *et al.* 2020). Strawberry tree fruits are also well known to contain interesting concentrations of

antioxidants such as flavonoids, carotenoids, vitamins E and C and anthocyanins (Pawlowska *et al.* 2006; Pallauf *et al.* 2008; Alexandre *et al.* 2020). Anthocyanins are important for human and animal diet as nutrients. They belong to the group of phenolic compounds and are recommended in several studies for daily intake with the estimated amount around 11.6 mg (Wallace and Giusti, 2015). Anthocyanins have been largely studied by the scientific community, especially during the last decade, and have been demonstrated to possess functional properties on human health, hence playing many functional roles in the prevention of many diseases (Yousuf *et al.* 2016; Li *et al.* 2017; Rupasinghe *et al.* 2019). Recently, anthocyanins extracted from natural sources have been used in food industries for several purposes, especially as colourants (Ali *et al.* 2016; Yousuf *et al.* 2016; Cortez *et al.* 2017; Fernandes *et al.* 2018).

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