

Pilot-scale hydraulic-pressure extraction of Sukari date honey (*Phoenix dactylifera* L.) to enhance resource efficiency: Effects of processing parameters on bioactive compounds, and physicochemical quality

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Funding information

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Abstract

The present study explored the hydraulic pressure process as an alternative process to the conventional extraction of date honey. In this regard, response surface methodology (RSM) and central composite design (CCD) were utilized as process optimization tools to achieve the highest yield and efficiency. Independent processing parameters were temperature (50–60°C) and pressure (4–12 bar). Moreover, the effect of optimum conditions on the quality and active compounds of date honey were studied. The results showed that the optimum conditions to give the highest yield (45.83%) and extraction efficiency (87.99%) were a temperature of 60°C and a pressure of 8.83 bar with a come-up time of 6 hr. The pH values of extracted date honey were higher than the conventional method. The change in pH values was described using the first-order kinetic equation. While moisture content and acidity were significantly lower than the conventional method, hydraulic pressure increased the ash, protein, total sugar, reduced sugar, pectin, and total soluble solids. The valorization approach developed in this study provides a platform for producing high-quality date honey as a value-added product from an underutilized date. The findings can help with enhancing resource efficiency through agricultural waste valorization.

Practical Applications

Hydraulic press extracted the date honey at a pilot scale and showed good potential for further upscaling. This method addressed a significant concern of conventional extraction, that is, quality deterioration. In addition, the hydraulic press enhanced the extraction yield and process efficiency. Furthermore, results elaborated on the effects of processing parameters. Such approaches can be used in the industry to enhance resource efficiency and to help with achieving sustainable development goals (SDGs).

1 | INTRODUCTION

Date palm (*Phoenix dactylifera* L.) plays a vital role in human life as it has been used for many needs, such as a rich source of energy, vitamins, and bioactive compounds (Lammari et al., 2020). It has also been used as an

important material in nanotechnology (Ma'abreh, Abu-Salah, Al-Awaadh, & Mohamed, 2018). In addition, the inhabitants of Mesopotamia used date fruit to extract date honey (dibs) and vinegar. The extraction of date honey is one of the common industrial practices in many countries that usually rely on second-class dates and surplus dates (Djaoud et al., 2019).