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NEW TECHNOLOGICAL METHODS TO CONTROL HMF FORMATION IN DATE SYRUP DURING PROCESSING

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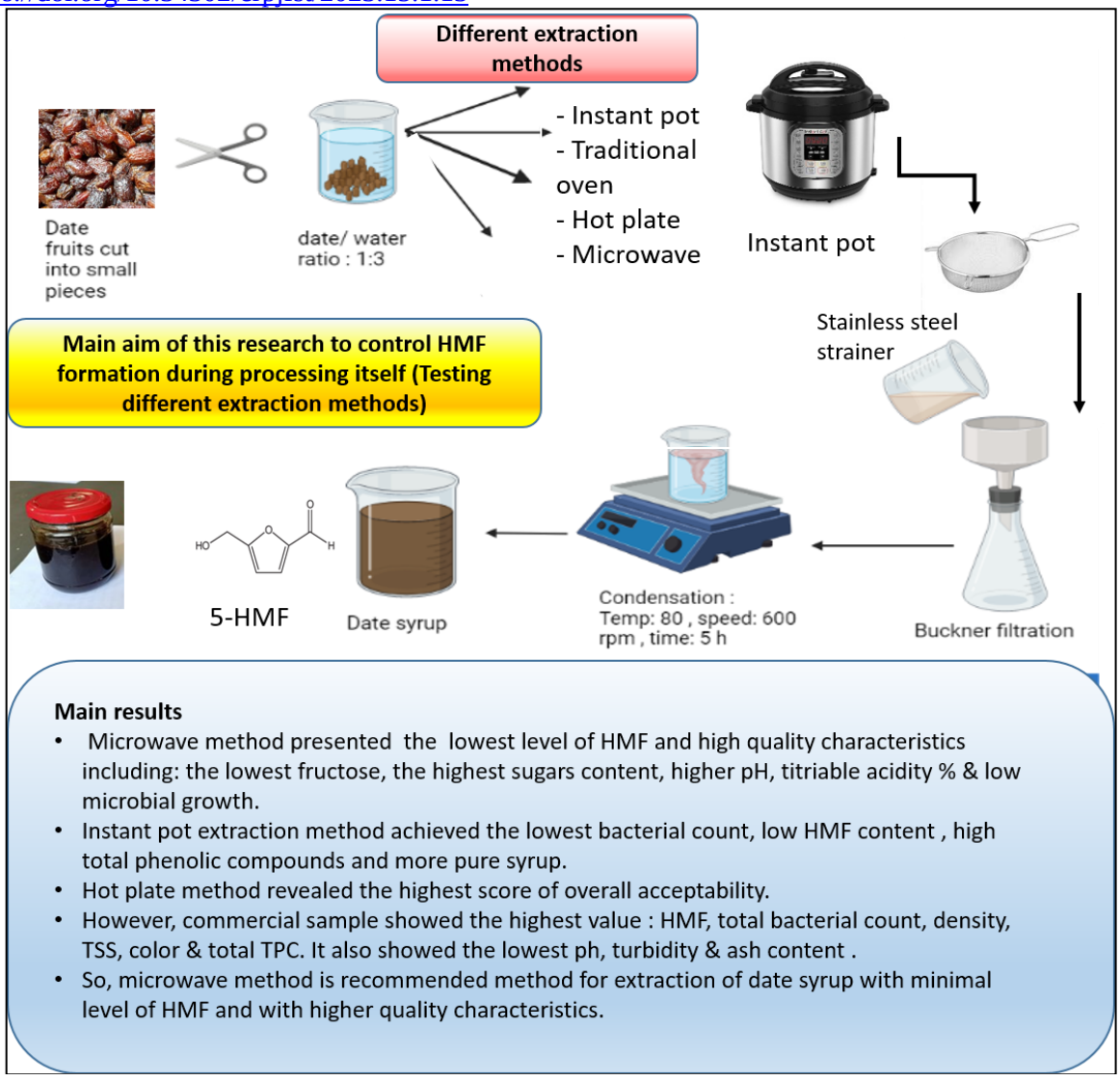

Figure 1. Graphical abstract clarify date syrup processing steps and the new proposed techniques (New extraction methods) that may reduce formation of HMF during manufacture processing itself.

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ABSTRACT

Date occupies a position between many crops with its nutritional and medicinal values. The higher fruit loss induces the processing of these fruits to convert to useful products, such as date syrup and date paste. Date syrup is characterized by its high nutritional value. However, it contains a toxic-hazard compound (5-hydroxyl methyl furfural). This compound is usually formed as a result of the dehydration of sugars under higher temperatures during processing (Millard reaction). So, the present paper aimed to reduce HMF levels in date syrup during processing using different extraction methods. The obtained results emphasized that the extraction method has a great influence on HMF levels of the lab-produced date syrup compared with the commercial sample. Where instant pot, traditional oven, hot plate, microwave methods, and commercial sample recorded HMF levels ranged (from 503.63, 285.38, 1010.00, 240.13 & 1844.30 mg/ kg, respectively). In this regard, the microwave extraction method presented the best results concerning with safety of the product: the lowest level of toxic hazard (5-HMF) and high-quality characteristics including Fructose, pH, titriable acidity, and a high score of overall acceptability of Panel test. Meanwhile, the instant pot extraction method was characterized by a low level of HMF and the lowest microbial count. While the commercial sample featured elevated levels of (5-HMF), the highest bacterial count, and the darkest color. The commercial sample also showed the highest score in the following: TSS, density, specific weight, color, and total phenolic compounds. However, it showed the lowest score in turbidity, EC, total, and sulfated ash %. Also, sensory evaluation by Hedonic scale showed consumers' appreciation of date syrup especially extracted using microwave methods. So, the microwave method is recommended method for the extraction of date syrup with a minimal level of HMF and higher quality characteristics.