Applications of mango byproducts in the food industry

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Introduction

Mango (Mangifera indica L.) is a tropical fruit, worldwide appreciated due to its sensory features and nutritional properties. In 2018, mangoes were the most produced tropical fruit (excluding bananas) and ranked sixth place considering worldwide production of all fruit crops (1).

Fig 1 – Anatomical parts of mango / mango fractions denominated by the processing industry.

Overall, mango peels and stones are not consumed or included in processed products. It is estimated that, each year, 14,537 – 22,844 million tonnes of mango byproducts are generated (1). Currently, most mango byproducts are discarded in landfills or incinerated, which leads to economic losses and severe environmental problems. However, mango byproducts have a high potential to be used as a source of functional ingredients and food preservatives due to their high nutritional value and bioactive properties (2).

The goal of this work was to present and discuss the potential applications of mango byproducts in the food industry.

Nutritional Value and Bioactivity of Mango Byproducts

Mango peels contain high amounts of fiber, ascorbic acid, tocopherols, phenolic compounds and carotenoids (2). In turn, mango kernel is a good source of edible fat, essential amino acids, antioxidant minerals, vitamins A, E, K, and C and phenolic compounds (3).

Table 1 – Nutritional composition of mango byproducts

<table>
<thead>
<tr>
<th>Carbohydrates</th>
<th>Fiber</th>
<th>Fat</th>
<th>Protein</th>
<th>Ash</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peels</td>
<td>80</td>
<td>51</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Kernel</td>
<td>32 – 77</td>
<td>0.3 - 5</td>
<td>6 - 15</td>
<td>6 - 10</td>
<td>1 – 4</td>
</tr>
</tbody>
</table>

All values are expressed on a dry weight basis (g / 100 g of dried peels).

Regarding bioactivity, mango byproducts have antioxidant, anti-proliferative, anti-inflammatory and antibacterial properties (2,3). Furthermore, mango peels also show prebiotic activity (3).

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Mango peels have potential to be used as source of pectin and natural food additives namely, antioxidants, antimicrobials and co-pigments (2,4).

In turn, mango kernels are a good source of edible fat and starch. Mango kernel fat has several advantages, namely, resistance to auto-oxidation, the capacity to prevent lipid oxidation of other oils and the absence of trans fatty acids. Furthermore, their chemical and physical features are very similar to cocoa butter (3).

Besides that, one of the most promising strategies to reuse both mango byproducts is to convert them in added value powders / flours (2,3).

Fig 3 – Processing of mango byproducts in added value powders / flours (2,3).

Fig 4 – Incorporation of mango byproducts powders in food products improved their nutritional properties and bioactivity (2,3).

Conclusion

The application of mango byproducts in the development of functional ingredients and natural preservatives represents a new source of income to mango processing industries and reduce the biowaste discarded.

Besides that, these applications avoid over-exploitation of natural resources to produce the same ingredients or additives that can be replaced by mango byproducts compounds. Until now, the incorporation of mango byproducts powders has been studied mostly in bakery products. A better understanding of the impact of different processing methods on mango peel powders’ properties can contribute to reinforce their use in bakery products and also to expand their application to other types of food products.

References


Acknowledgements

This work was supported by National Funds from FCT - Fundação para a Ciência e Tecnologia through project UID/Multi/50016/2019 and by FCT individual PhD grant SFRH/BD/143010/2019.