

Orange snacks as a solution for orange surplus in Portugal

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In the summer of 2022, Portugal experienced a downfall of the price of oranges, mainly due to pressure of the agricultural commodity market and the change in trade dynamics in Europe due to the war in Ukraine. The price of this fruit fell exponentially when oranges that normally go to the East were all brought to European markets. This caused some Portuguese producers to abandon much of their production, leaving about 93% of their crop rotting on trees¹.

One way to add value to a product is to transform it into something new. Dehydration can increase the value of the final product and extend its shelf life², but in the case of oranges, it is mostly used to obtain a powder that can be used as an ingredient³. The aim of this work is to produce a versatile, ready-to-eat orange crisp. Oranges are the only ingredient of this snack that can be presented in a variety of ways, such as a crunchy snack, an edible cake topping or as an ingredient in drinks such as gin or other drinks.

The product was fully characterised in terms of nutritional value, water activity (a_w), microbiology and sensory analysis. The result is a high-energy product with no added sugar, no fat and no salt. The final product has a low a_w value (0.238), which limits enzymatic and chemical degradation reactions and microbial development. In the sensory analysis (N=66), the snack received an overall score of 8 ± 1 (on a scale of 1 to 9) when asked if the product is something they would buy, the acceptance rate was of 96%.

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References:

- [1] SIC. Produtores do Algarve oferecem laranjas por falta de compradores - SIC Notícias. <https://sicnoticias.pt/pais/2022-08-28-Produtores-do-Algarve-oferecem-laranjas-por-falta-de-compradores-3bfb6029> (accessed 2022-12-28).
- [2] Takounadi, E.; Boroze, T. E. T.; Azouma, O. Y. Effects of Drying Conditions on Energy Consumption and the Nutritional and Organoleptic Quality of Dried Bananas. *J Food Eng* 2019, 268.
- [3] Ingrassia, M.; Sgroi, F.; Tudisca, S.; Chironi, S. Study of Consumer Preferences in Regard to the Blonde Orange Cv. Washington Navel "Arancia Di Ribera PDO." *Journal of Food Products Marketing*, 23 (7), 2017 799–816.