Increase of calcium in Rocha pear (*Pyrus communis* L.) for development of functional foods: Localization and characterization of minerals in fruits

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Abstract

The food industry is bound to face some challenges in the future, one of them being in finding ways to feed a growing population set to reach up to 9 billion people by 2050 while maintaining food quality, in the meads of resource limitations and sustainable use of them. In this outlook, minimizing mineral deficits in human diet should help prevent health diseases, which are present majorly in developing countries but also in developed ones. Food industries may acquire a participating role in this problematic by producing functional foods. Calcium is one of the most abundant minerals in human organisms. It performs both structural and signaling functions, and its deficits are associated with the development of osteoporosis and similar pathologies. Following this matter, the use of foliar applications in order to increase the amount of minerals in the edible part of plants, will result in unprocessed foods with additional value, allowing the production of functional foods. From May to August of 2018, in one orchard located in the west region of Portugal, a biofortification itinerary was implemented. It was applied a total of seven foliar applications. The first two with two different products, calcium chloride and calcium nitrate, with three different concentrations each, and the other five applications used only calcium chloride, in higher concentrations. At harvest, with an XRF analyzer, an increase in calcium levels was found varying between 33 and 67 %. Additionally, using μ-EDXRF on pears subjected (biofortified) or not (control) to the biofortification itinerary, five zones were defined (between the core and epidermis), and the location of calcium was revealed to be prominent near the epidermis and core of pears. In conclusion, calcium levels increased in fruits after foliar application, prevailing in both external and core zones, enabling the production of functional foods.

Recent Publications

1. EFSA NDA Panel (2015) Scientific opinion on dietary reference values for calcium. EFSA Journal 13:1-82.
2. FAO (2017) The future of food and agriculture – Trends and challenges. Rome ISBN 978-92-5-109551-5.
3. Garg M, Sharma N, Sharma S, Kapoor P, Kumar A, Chunduri V, Arora P (2018) Biofortified Crops Generated by Breeding, Agronomy, and Transgenic Approaches are Improving Lives of Millions of People Around the World. Frontiers in Nutrition 5:1-33.
4. Lidon FC, Ribeiro V, Reboredo FH, Pessoa MF, Santos M, Ramos P, Sánchez C (2014) Calcium Biofortification of Apples – Interaction with Macronutrients. Mineral-Improved Crop Production for Healthy Food and Feed - Proceedings book 102-103.
5. Reboredo FH, Sánchez C, Santos M, Ramos P, Rodrigues C, Ribeiro V, Pessoa MF, Lidon FC (2014) Calcium Biofortification of Apples – Implications on Fruit Quality Parameters. Mineral-Improved Crop Production for Healthy Food and Feed - Proceedings book 52-53.



Biography

Cláudia Pessoa has a background formation of both Biochemistry and Production Technologies and Agro-Industrial Transformation. Currently a PhD student in Agroindustrial Technologies, and following the work developed in the masters, revolving around the use of foliar applications as a way to increase calcium in Rocha pear (*Pyrus communis* L.), presently, her research area focuses around functional foods, in order to minimize mineral deficits in human diet. This work entails contact with techniques related to the evaluation of quality parameters in fruits and vegetables throughout their development and post-harvest phase, as well as mineral localization and characterization with different X-ray fluorescence spectrometry techniques.

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Notes/Comments: