

Increasing the glass transition temperature by centrifugation to produce Clean Label tomato powder by spray drying

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Producing fruit powder such as tomato by spray drying is a challenge because of their high sugar composition. Drying of these types of products is subject to sticking and agglomeration of the powder during drying, which leads to a considerable drop in drying yield. Bhesh R. et al. (1997) stated that in order to avoid wall sticking and caking phenomena, the drying exit temperature should be lowered to 10-20°C below the glass transition temperature (T_g) of the product. However, it is not obvious to guarantee a product temperature at the end of the process, or during storage, lower than its T_g. This problem can be partly solved by raising product T_g by adding soluble dry matter. Maltodextrin is the most commonly used bulking agent to increase T_g of the products and avoid these phenomena during drying. However, the use of these additives has disadvantages such as bad effects on consumer health and reduction of bioactive nutrients concentration in the product. The objective of this study is to increase the T_g of the product, which is around 25°C, to a value close to 50°C at the end of the drying process in order to improve the drying yield and to obtain a tomato powder free of maltodextrin. Reducing directly the sugar content of the tomato juice before drying is a good alternative to increase the T_g of the product and avoid the use of these ingredients. Centrifugation at an acceleration of up to 13,000 g at a maximum duration of 15 min significantly reduces the sugar content of tomato juice. The increase in T_g with reduced sugar content is investigated in this work. These results are correlated to the behaviour of the powders submitted to different spray drying conditions. The aim is to produce tomato powder of high quality and allowing the consumer to take advantage of the molecules of interest of the tomato such as lycopene.