

Popular Science Summary

Study on mandarin concentrates production process by using an inexpensive on-site fruit preservation technique

A stable mandarin concentrate was obtained by using a new drying technique which combines a membrane separation technique and the use of renewable solar energy. The characteristics of the rehydrated juice resembled the fresh mandarin juice.

The US Government estimates that there is 25-40% fruit post-harvest loss due to spoilage in Mozambique. This loss also means income loss for the farmers. Furthermore, sophisticated facilities to preserve the fruits, such as pasteurisation, need a high amount of capital to be built and therefore, not a practical solution for small scale farmers. Solar Assisted Pervaporation (SAP) technique tries to answer the problem by providing an inexpensive and robust technique to prolong the shelf life of the fruits which leads to higher income for the farmers.

SAP technique uses a 'breathable' membrane pouch and it is combined with solar energy to increase the efficiency of the drying process. As a new technique, there is still ample room for exploration of SAP. One of the most important things is to compare the characteristics of the fruit concentrate and the rehydrated juice if the drying process is performed with and without the membrane pouch.

SAP offers a more hygienic way of drying and protection of the product from the contamination. However, it was desired to know whether the SAP method could provide more advantage regarding quality preservation compared to the conventional drying method in open dish trays. In this project, the drying characteristics and the chemical reactions occurring during the drying were studied. The loss of vitamin C and the change of colour of the concentrate and the rehydrated juice were measured. The vitamin C content and colour represent the most important quality parameters to deliver a high-quality product to the consumers.

By knowing the drying characteristics and also identifying the possible chemical reactions take place during the preservation process, an optimal product can be designed. The drying characteristics provide critical information which can be used to predict the drying time if a different drying temperature, a different dimension of the membrane pouch or a different volume of the sample are used. The identification of chemical reactions provides insight on how harsh the drying process impact the nutrition content so that preliminary actions (e.g. fortification, blanching, etc.) can be estimated.

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Understanding and Identifying Ranges for Critical Parameters of Orange Juice Concentrate during Drying by Using Solar Assisted Pervaporation (SAP) Fruit Preservation Technique