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Vacuum Ohmic Heating: A Promising Technology for the Improvement of Tomato Paste Processing, Safety, Quality and Storage Stability

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Abstract: Ohmic heating (OH) is an electrothermal technology used to inactivate enzyme and microbial activities. This work aimed to study the impact of Ohmic Heating Under Vacuum (OHUV) which compared to conventional heating (CH) as well as storage stability at 5°C and 25 °C on microbial safety, and nutritional quality. The evaluation parameters were pH, titratable acidity, TSS, lycopene, ascorbic acid, PME, HMF, and microbiological activity. The obtained results showed that tomato paste samples that were treated by OHUV are significantly superior to CH in terms of all physicochemical and microbiological characteristics, as well as being the least harmful during storage in both transparent and dark packages. The results showed the changes in ascorbic acid, lycopene, and HMF values that were treated by OHUV at 25 °C and filled in transparent package are most affected compared to other treated samples. On the other hand, tomato paste samples stored in dark packages at 5 °C performed significantly better than those subjected to CH under the same conditions and activated PME the most had higher ascorbic acid and lycopene and fewer changes in HMF during storage time for 90 days. OHUV found to be a good alternative treatment in the production of tomato paste.

Keywords: HMF, Ohmic heating, Paste, PME, Tomato.

Introduction

Tomato (*Solanum lycopersicum* L.) is one of the most planted crops in the world and the fourth most economically valuable food crop with an estimated worldwide production of 88 billion US$ (FAOSTAT, 2019; Buajaila *et al*., 2021). It is considered one of the most valuable crops because of its high content of essential nutrients and antioxidant-rich phytochemicals (Ali *et al*., 2021; Xalmuminova & Sulaimonova, 2021). Also, tomato fruit is rich in flavonoid and anthocyanin content (Hmiz *et al*., 2019). Therefore, it reduces the activity of free radicals besides containing a variety of vitamins such as vitamin A and ascorbic acid, phenolic compounds including phenolic acids and flavonoids, lycopene, minerals, fiber, and carbohydrates, which have a positive impact on health due to bioactive compounds that are