The effects of different drying methods on bioactive substances in berries

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Outline

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Abstract

Fruits are rich in carbohydrates, vitamins, minerals, phenolic compounds and other nutrients. However, due to the relatively high-water content of fresh fruits, it is easy to rot due to the proliferation of microorganisms, which poses a great challenge for transportation and storage. Drying can removes moisture from the biological products to prevent spoilage and increase shelf life. According to Turkiewicz et al. (2019) and Zia & Alibas (2021), there are some different drying methods, including convective drying (CD), vacuum-microwave drying (VMD), a pre-treatment by convective drying and finished by vacuum-microwave drying (CVMD), freeze drying (FD), Natural drying (ND), Microwave drying (MVD), and the combined microwave-convective drying (MWCD). From the color, the results show that the increase in temperature in convective drying and power in vacuum-microwave drying resulted in a decrease in coordinate b*. Freeze-drying caused the smallest color changes. Also, freeze-drying contributed to the preservation of L-ascorbic acid at an equally high level (7306 mg/kg dw) as vacuum-microwave drying. Summarizing all drying methods, freeze-drying still ensures the highest content of total phenols. In blueberries, the results showed the total anthocyanin at 300 W shows the highest values. Regarding ascorbic acid values, drying at 500 W has a higher value than other dosages. Furthermore, 300 W has the best results for TPC. To conclude, freeze-drying ensures that the highest quality product is obtained, but consider to it cost. The best drying method can be in terms of color parameters, antioxidant capacity, anthocyanin content, and ascorbic acid content was the microwave drying method at 300 W. To save the most of nutrients, consider the microwave drying or the combined microwave-convective drying, and a pre-treatment by convective drying and finished by vacuum-microwave drying could be better than the convective drying.