



rethink food resources, losses, and waste **2025**

25-27 September
Athens, Greece

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RETASTE:

**Rethink Food Resources,
Losses, and Waste**

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Granulation of Fruit and Vegetable Pomace Powder With Hydrolyzed Bovine Collagen

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Abstract

Combination of fruit and vegetables pomace powder with hydrolyzed bovine collagen might have potential in development of dietary supplements with health benefits, such as 1) bridging a gap of dietary fiber (DF) associated with range of non-communicable diseases including obesity and 2) increased intake of glycine whose low availability is related to compromised detoxification system in individuals with obesity. Moreover, combining with hydrolyzed collagen can improve viscosity of pomace powder suspensions whose consumption is limited by low water solubility related to presence of insoluble fiber. Here, apple, beetroot and celery pomace powder (APP, BPP and CPP) was granulated with hydrolyzed bovine collagen in order to improve nutritional, sensorial and rheological properties and obtain dietary supplements with high content of DF and polyphenolics, as well as peptides and amino-acids. Wet granulation was performed in a pilot-scale fluidized bed. A total of 250 g of APP, BPP and CPP was mixed with 50 g of collagen and granulated via top-spray of distilled water using a two-fluid nozzle at 1.8 bar. The mean liquid flow rate and air flow rate were 5 mL/min and 35 m³/h, respectively. Granules were dried by fluidization at 40 °C for 15 minutes. To prevent granule disintegration caused by collisions and attrition, the air flow rate during drying was reduced to 30 m³/h. Physical and technological properties before and after granulation, including bulk and tapped density used to calculate the Carr Compressibility Index (CI) and Hausner Ratio (H), which characterize flowability, particle size distribution and water activity. According to the CI and H, the initial flowability of BPP and CPP was classified as very poor, while APP exhibited poor flowability. After granulation, the flowability of BPP and CPP was upgraded to fair, while APP demonstrated good flowability. The comparison of fractional particle size distribution based on the projected particle diameter for APP, BPP, and CPP before (0 and 300 µm) and after granulation (25 - 650 µm) confirmed a significant increase in particle size. Water activity monitored during storage confirmed the superior storability of granulated APP, BPP, and CPP, with values ranging from 0.3 to 0.4. Total content of polyphenols (TPC) and antioxidant (AO) activity were determined upon in vitro digestion of starting and granulated APP, BPP and CPP. Pronounced AO activity and TPC were preserved during the granulation and storage. Fluid bed granulation with hydrolyzed collagen improved the nutritional value of APP, BPP and CPP, which already offer several benefits, including an easy way to increase DF intake, which is essential for digestive health, regular bowel movements, and body weight management. Also, favorable physical properties important for convenient handling, consumption, and application

in dietary supplementation were achieved.

Keywords: apple, beetroot, celery, pomace, collagen, fluid bed, granulation

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