

# The use of nonthermal techniques for the extraction of fibers and bioactive compounds from red beetroot peel

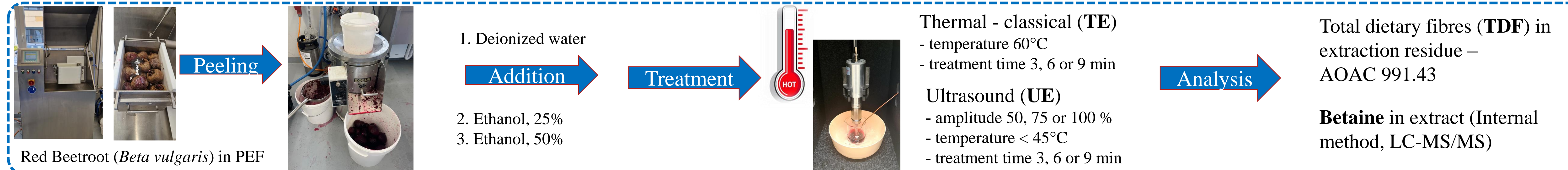
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## Introduction and Objectives

Because of climate change and emerging necessity to reduce overall environmental impact, sustainability has become one of the key aspects in food industry. As food waste reduction and management present an integral part of circular economy, ventures aimed towards its effective minimization which support zero waste concept are of increased importance. Pulsating electric field (PEF) belongs to the new generation of innovative, non-thermal processing technologies and has shown to be environmentally friendly and cost-effective technique for food processing. From PEF-pretreated red beetroot peel, fiber and betaine were extracted with ultrasound and classical extraction. Dietary fibers are part of balanced diet and play a key role in maintaining the health of the human body, since the benefits of consuming foods rich in dietary fibers are numerous and varied. Average European citizen does not consume the recommended daily intake of fibers [1]. In addition to encouraging increased intake of foods naturally rich in dietary fiber, one of the ways is to enrich foods and add fiber to different food products. Betaine is produced in the human body from choline and the amino acid glycine. As with folic acid, vitamin B6 and vitamin B12, betaine may function as a methyl donor and aid in proper liver function, cellular replication, and detoxification reactions [2]. Betaine is rich in foods, such as wheat bran, wheat germ, spinach, beets, and whole grains, although exact values will vary with different sources of foods and cooking methods.

## Materials and Methods



## Results

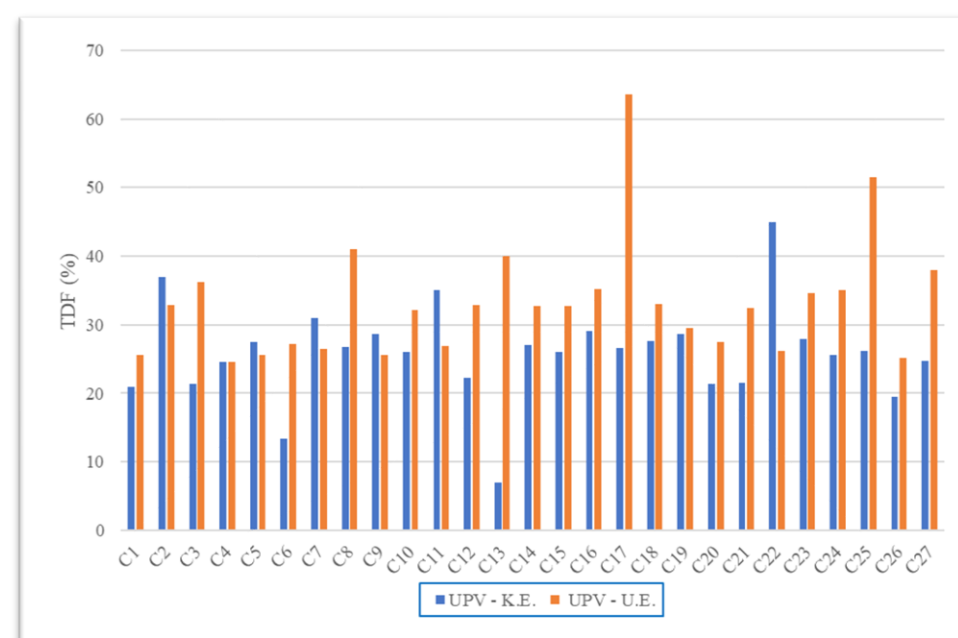


Figure 1. Comparison of TDF obtained by TE and UE (C1-27)

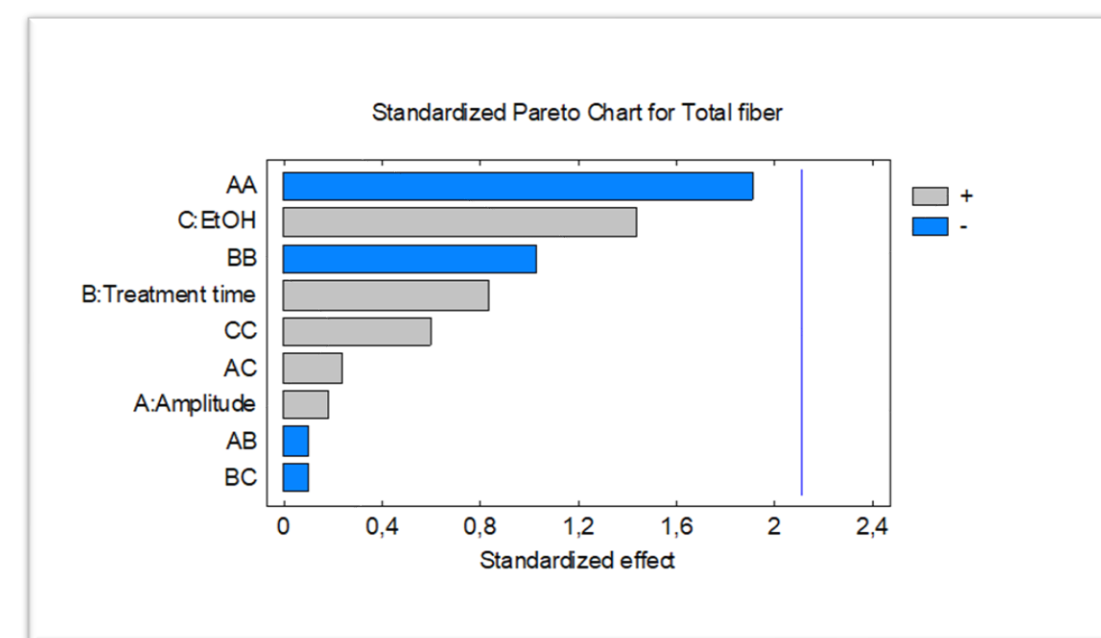


Figure 2. Standardized Pareto chart for TDF

## Conclusion

- Quantity of TDF obtained by UE of red beetroot peel under different amplitude, treatment time conditions and solvent exist, but they are not statistically significant.
- Taking into account the individual results of TDF and the statistical significance of the amplitude value and treatment time to the same, the optimal value of the amplitude parameter is 75%, treatment time is 6 minutes and ethanol content 50%. This is confirmed by the results of the optimization of parameters for the maximum output value of TDF
- Content of ethanol in the solvent does not have a statistically significant value- economically and environmentally it is much more acceptable to use deionized water as solvent.
- Comparing the TDF values obtained by TE and UE (Figure 1), it is concluded that a higher percentage of fibers is found in the UE extraction residue.

## Literature

1. World Health Organization & Alliance for Health Policy and Systems Research. (2020). 2019 annual report: Alliance for Health Policy and Systems Research. World Health Organization
2. S.H. Zeisel; M-H Mar; J.C. Howe; J.M.Holden; Concentrations of Choline-Containing Compounds and Betaine in Common Foods, The Journal of Nutrition, Volume 133, Issue 5, May 2003, Pages 1302–1307