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## Betalains recovery from beetroot skins using different extraction methods

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**Abstract:** Red beetroot (*Beta vulgaris* L.) is an important and rich source of bioactive compounds, due to the presence of betalains in high amounts. Large amounts of red beetroot byproducts (skins, pomace) result from its processing. Betalains are vegetal pigments, derived from the betalamic acid, and are classified in betacyanins and betaxanthins. Betalains are included in a group of water-soluble polyphenolic compounds, with important biological activities such as antidiabetic, anti-inflammatory, anti-carcinogenic, and antioxidant properties.

The objective of this study was to evaluate the content of betalains from beetroot skins using two different extraction methods such as conventional extraction and ultrasound-assisted extraction.

**Keywords:** betalains, beetroot skins, extraction methods, polyphenolic compounds

### • Introduction

Vegetable based food have become important commodities because they are associated with healthy food products by the consumers, so their commercialization has increased in the last years. Vegetables like red beetroot are very important because they are consumed fresh or are used as a raw material for juices, puree, salads, etc.

Therefore one of the main challenges in red beetroot byproducts processing is the preservation of betalains which is an important issue because they are highly unstable.

Betalains are derivatives of betalamic acid and can be classified into two groups: red-violet betacyanins (BC) and yellow betaxanthins (BX). These differ by the conjugation of an aromatic ring substituted with the 1,7-diazaheptamethinium chromophore, which is present in betacyanin. Betalans are water-soluble nitrogen-containing pigments that are synthesized from the amino acid tyrosine in two structural groups: red-purple betacyanins and yellow-orange betaxanthines.

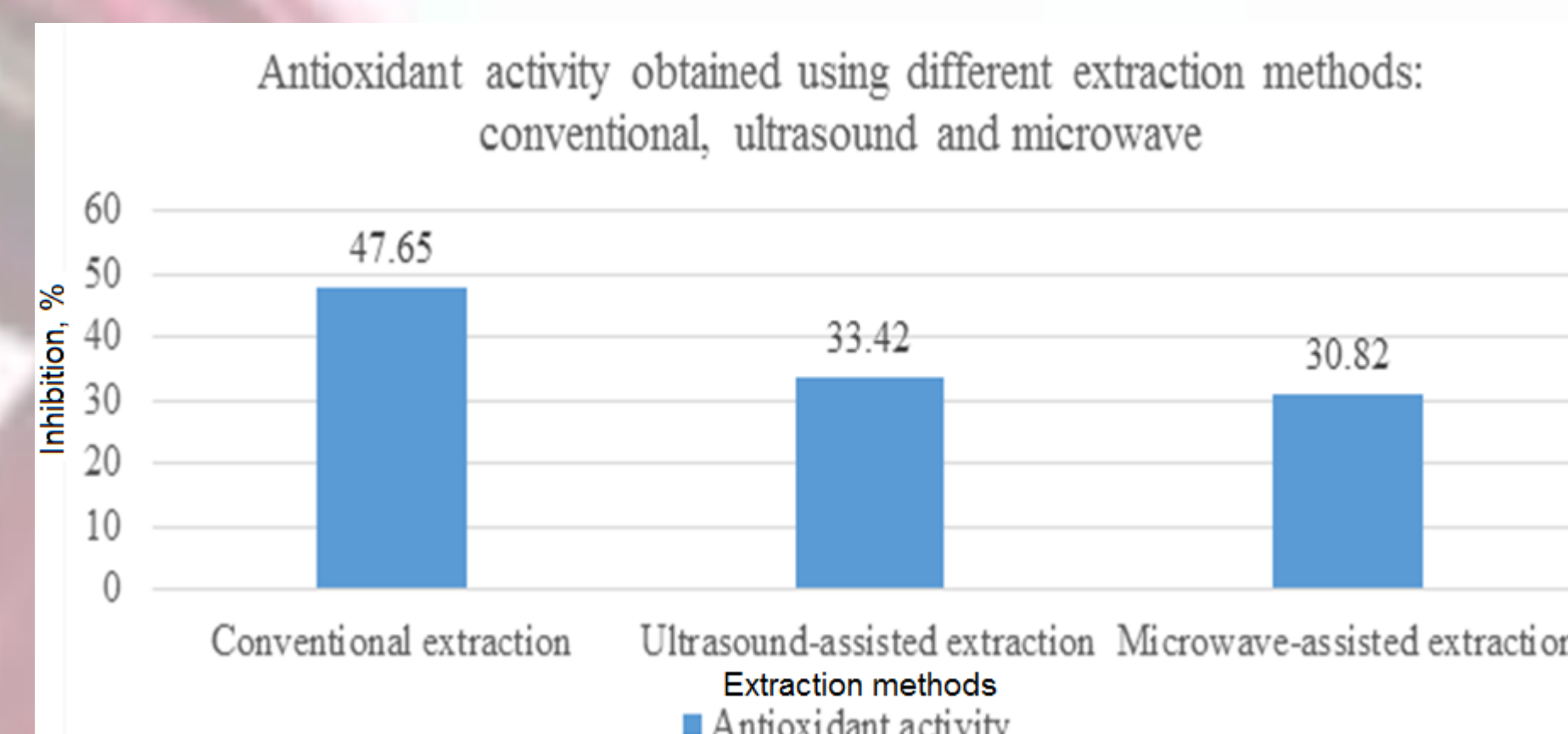
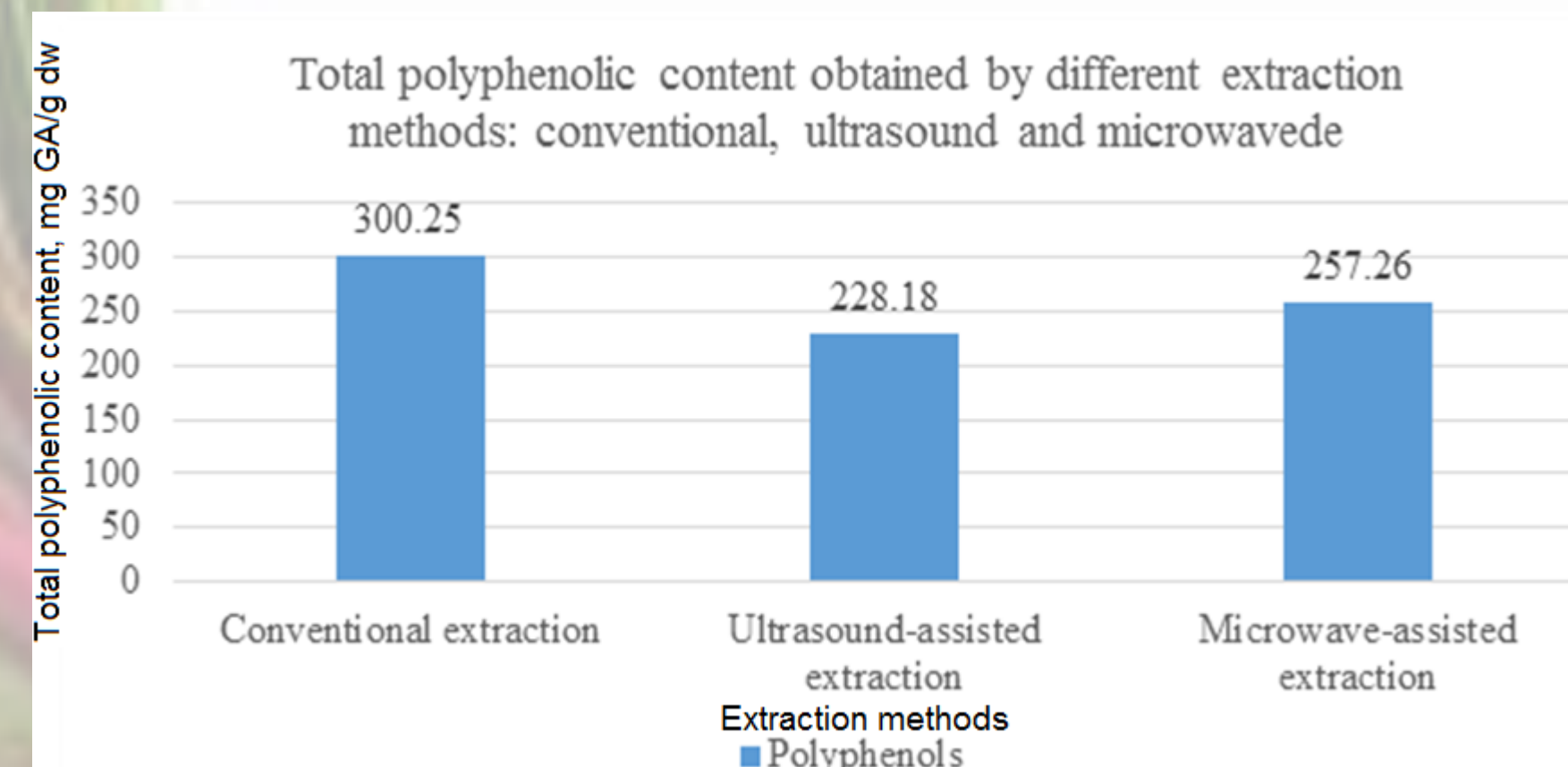
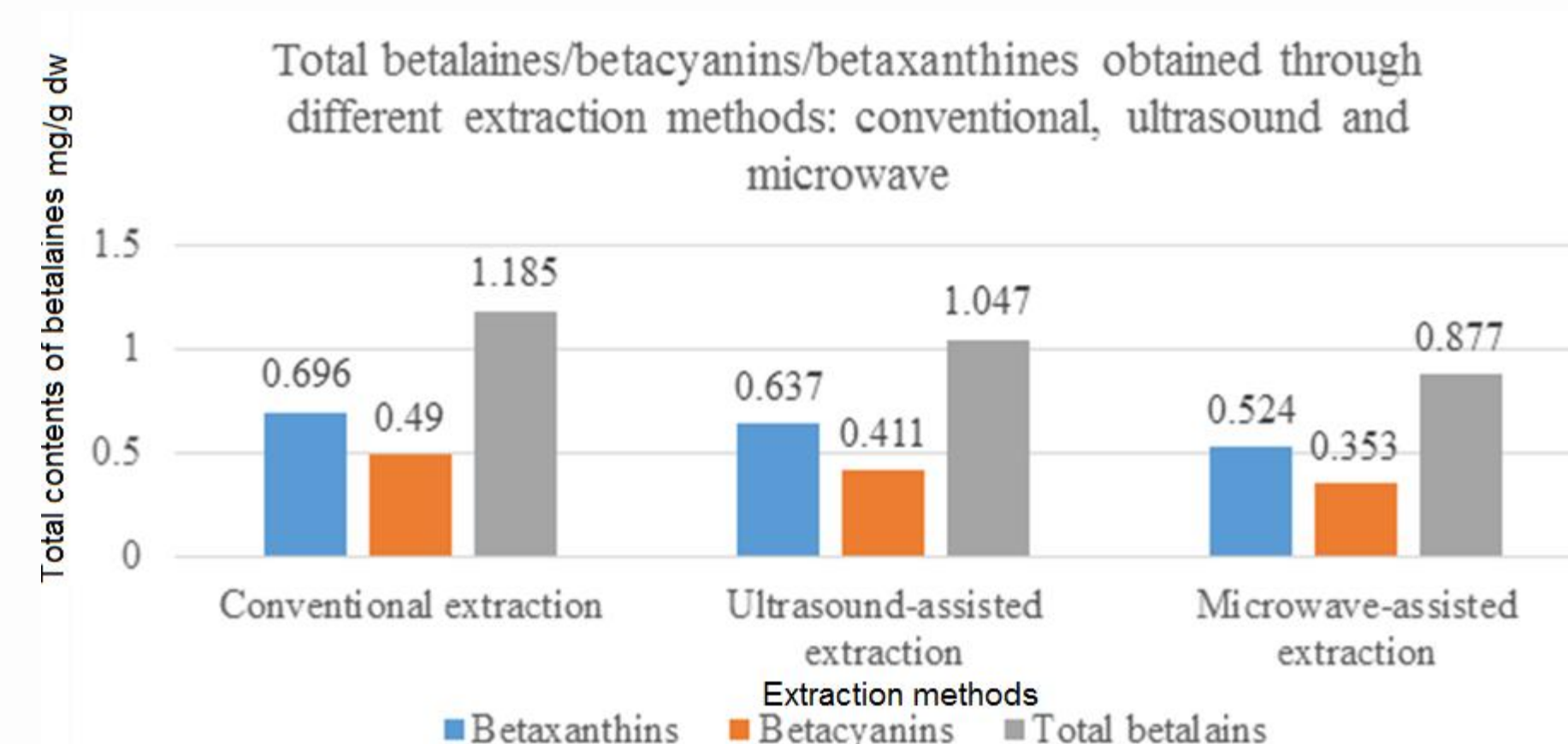
### • Material and method

The red beetroot (*Beta vulgaris* L.) were purchased from the local market: BRATESLEG GRUP SRL. The reagents used were purchased from Sigma (Sigma-Aldrich Co, St. Louis, MO). All other chemicals and reagents were used without any further purification.



Spectrophotometric methods were used in order to quantify betalains (480 nm for betaxanthines and 538 nm for betacyanins), total polyphenols (765 nm) and the antioxidant activity (510 nm). The betalain content, total polyphenolic content were expressed as mg/g dw, whereas the antioxidant activity was expressed as percentage.

### • Results and discussions



### • Conclusions

The results showed that the highest amount of betalains was obtained using the conventional extraction method  $1.185 \pm 0.76$  mg/g dw. Furthermore, in the case of ultrasound-assisted extraction, the total betalain content was  $1.047 \pm 0.03$  mg/g dw. Red beetroot skins are a renewable raw material and may serve as a new high-value ingredient, due to the presence of bioactive compounds.

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