

Bioaccessibility of phenolic compounds in different fruit pomaces

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Introduction

The fraction of residues that remains after juice processing ranges from approximately 15% for grapes to 50% for citrus. The high amount of phytochemicals make this kind of pomace beneficial to human nutrition. Agroindustrial by-products may contain significant amounts of antioxidants associated with the fiber matrix. Physiological properties of dietary fiber and phenolic compounds make these a promising food ingredient useful in enhancing the bioactive properties of products.

Objective

To analyze the effect of particle size on bioactives compounds and bioaccessibility of differents by-products.

Methodology

- Orange, apple juice and grape-wine by products obtained from industrial production were dried and grinded to obtain pomace powder at two sizes: 1mm and 0.5 mm.
- Pomace powder samples were submitted to an *in-vitro* digestion method to evaluate the effect of particle size on the digestibility and bioaccessibility of polyphenols.
- Field emission scanning electron microscopy (FESEM) was used to observe the microstructure of samples.

Conclusions

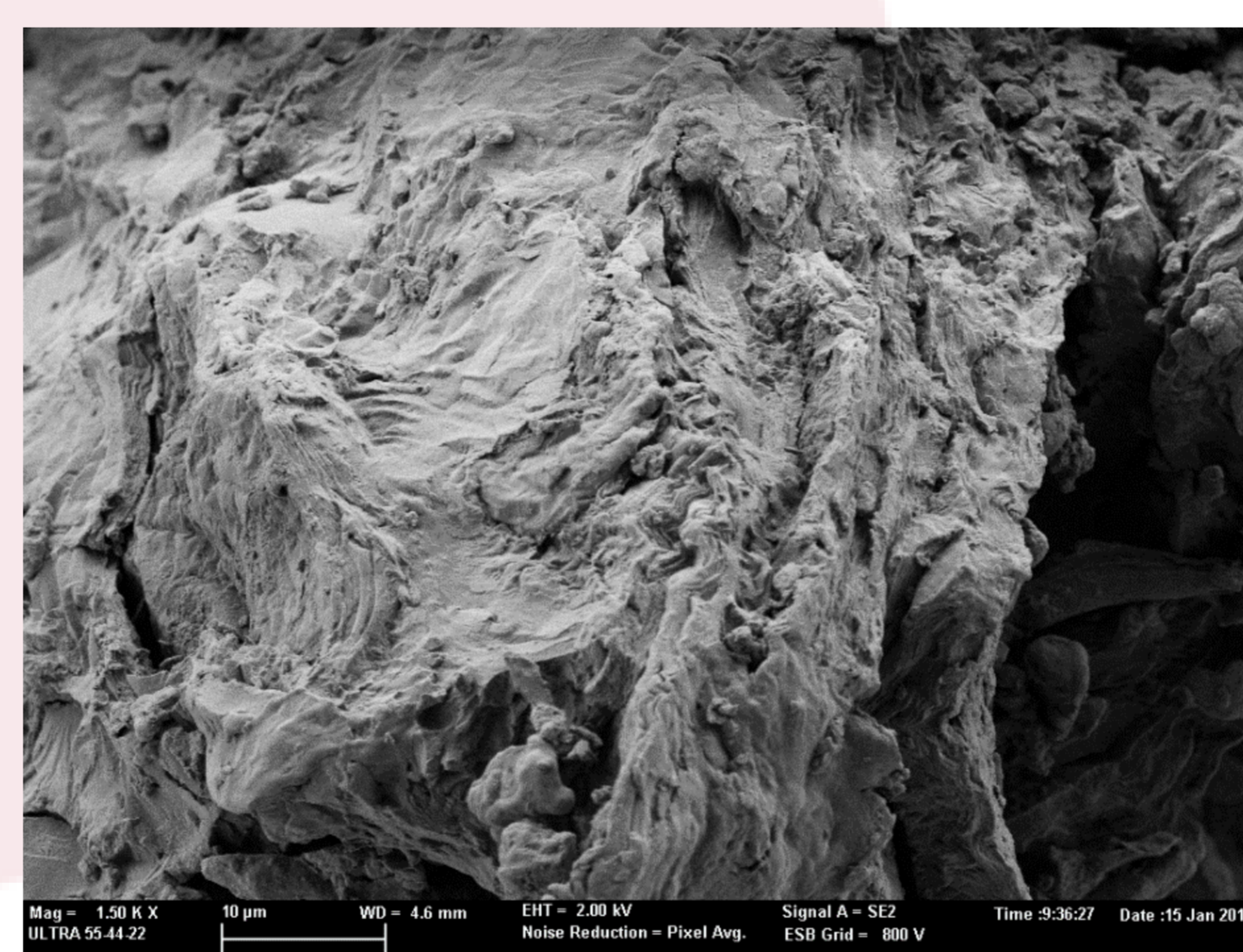
The bioavailability of antioxidants associated with fiber depend on the type of structure of the matrix.

Acknowledgment

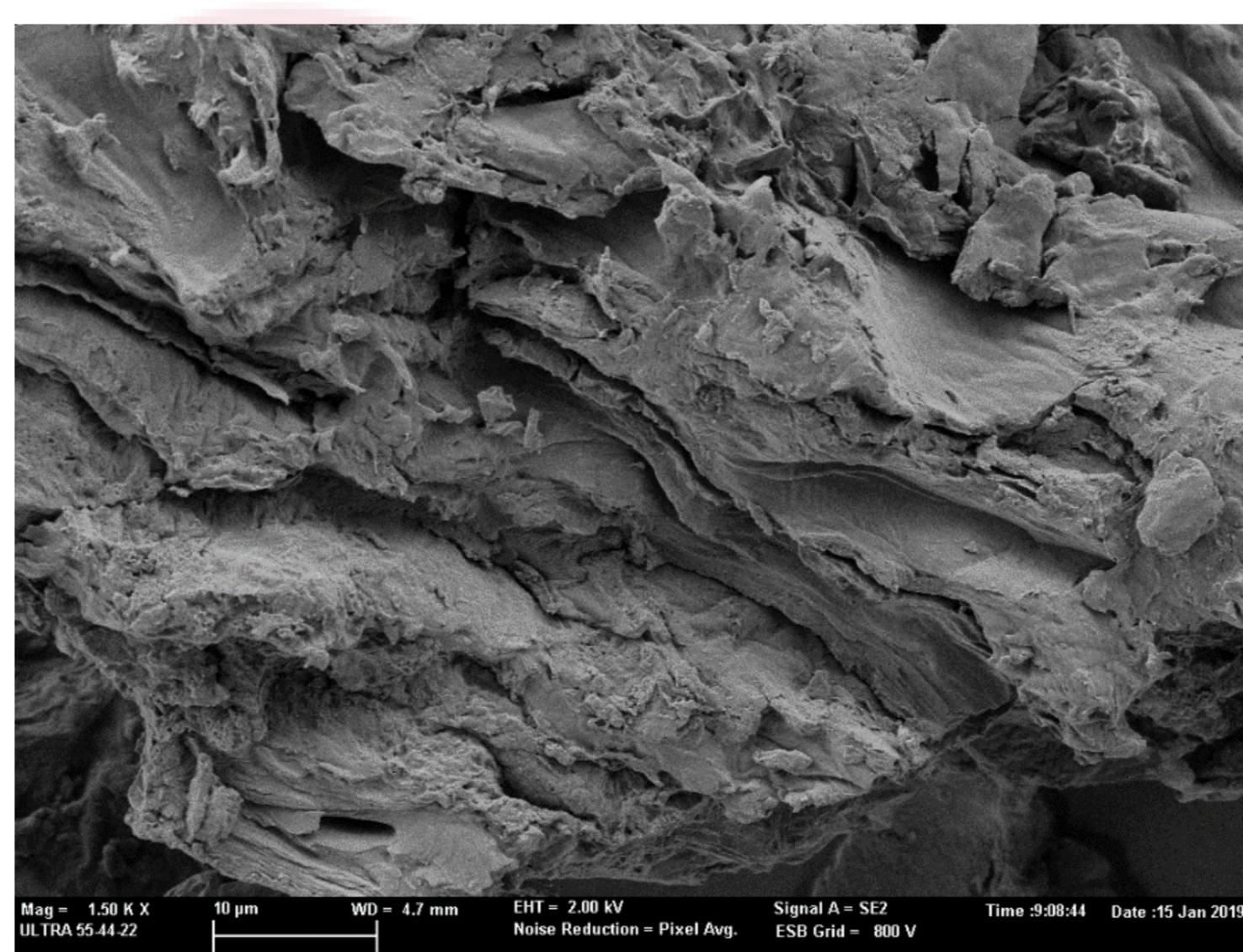
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Main findings

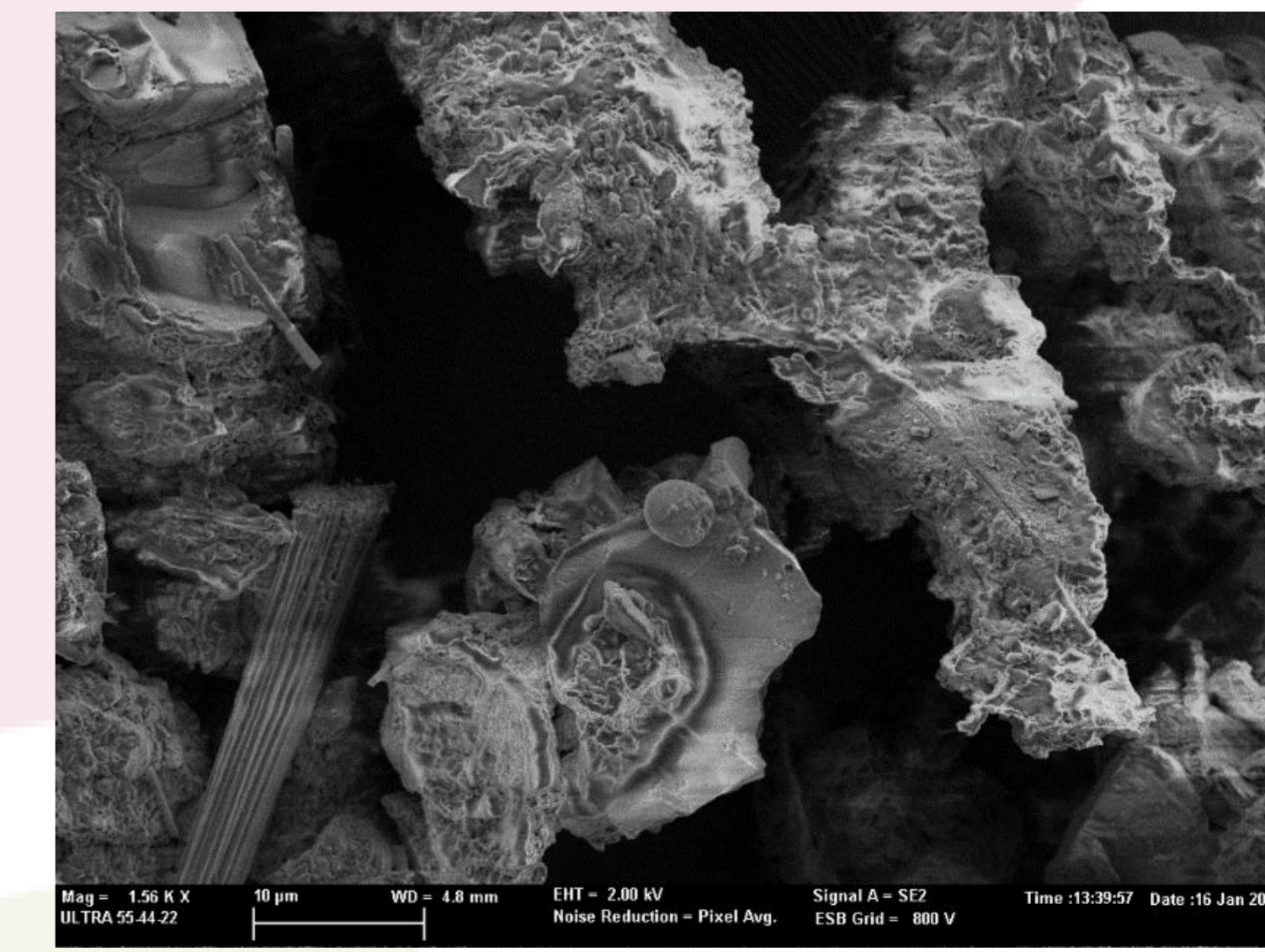
Contents in phenols in the undigested raw material were higher in grape > orange > apple, and were related to the microstructure. Grape pomace was observed as porous structure, so it was a more accessible structure, where extracting polyphenols was easier. However, orange structure pomace was more compact. Finally, apple pomace structure was even more compact than orange structure forming "glued" sheets, so extracting polyphenols in the apple raw material was more complicated.



Orange 0.5 mm



Apple 0.5 mm



Grape 0.5 mm

Samples	Polyphenols mg galic acid/100g		Bioaccessibility (%)
	Pomace powder	Digested	
Orange 0.5 mm	327.0	782.7	239
Orange 1 mm	422.6	1009.4	239
Apple 0.5 mm	162.3	620.4	382
Apple 1 mm	161.8	781.9	483
Grape 0.5 mm	1219.4	835.7	69
Grape 1 mm	1082.5	751.3	69

After digestion total phenol content increased in orange and apple pomace for both particle size. In apple samples, bioaccessibility of phenolic compounds showed a 5 fold increase for 1 mm sample size and a 4 fold increase for 0.5 mm sample size. In orange samples, for both sizes bioaccessibility increased but to a lesser extent (2.4 fold). In grapes samples, bioaccessibility decreased for both samples size (0.7 times respect to raw material). During digestion, the structure changed and phenols became more accessible, which would explain the increase in bioaccessibility.