

Carrot by-products' flour: development and characterization



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Framework

This work aimed to produce and analyse flours from carrot (baby carrot) by-products.

Fruit and vegetable by-products

They are peels, stems/cores, leaves, pomaces, unripe or damaged fruit/vegetable.

Correspond to ~14% of all food produced¹ and ~50% of industrial manufacturing².

Rich in fibre: from 30 to 90% of dry weight.

Rich in bioactive compounds (mostly bound to the fibre): phenolic acids, flavanols, flavonols, flavanones, flavones, coumarins, anthocyanins, carotenoids, tocols.

Health benefits: antioxidant activity, gut microbiota improvement, satiety increase, lower energy intake, prevention of chronic diseases (diabetes, obesity, cancers, cardiovascular diseases).

Flours advantages

Fruit by-products flours can be easily used as ingredients in several industries³ as:

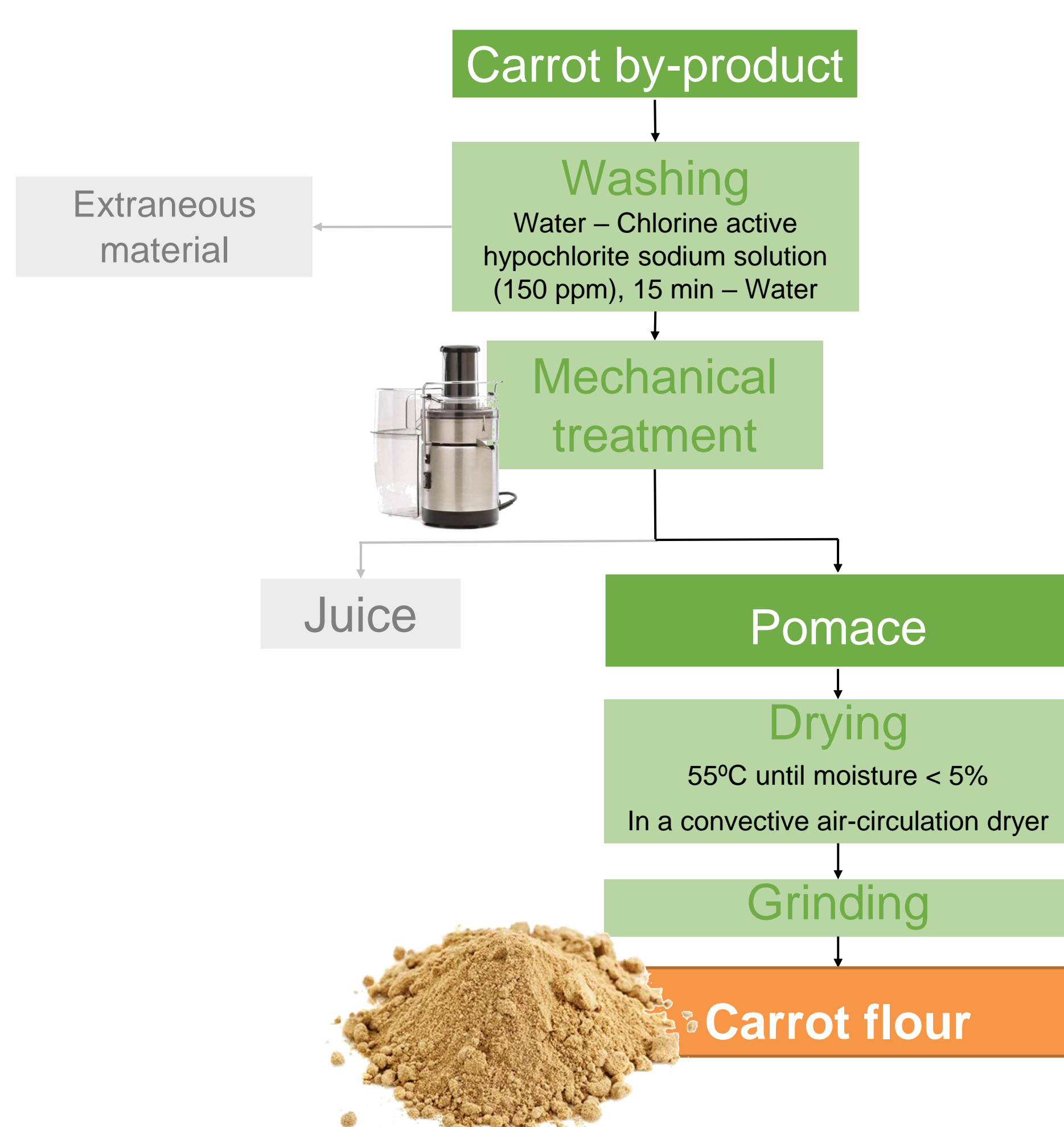
- Dairy (yogurts, ice cream, etc.)
- Bakery (cookies, cakes, breads, etc.)
- Animal products (meatballs, fish burgers, etc.)
- Beverage (functional beverages)

When applied into food products, they:

- ↑ fibre content
- ↑ bioactive compounds content, namely antioxidant activity and other health benefits
- ↑ shelf-life (due to antioxidant activity and antimicrobial)
- Provide natural colour pigments

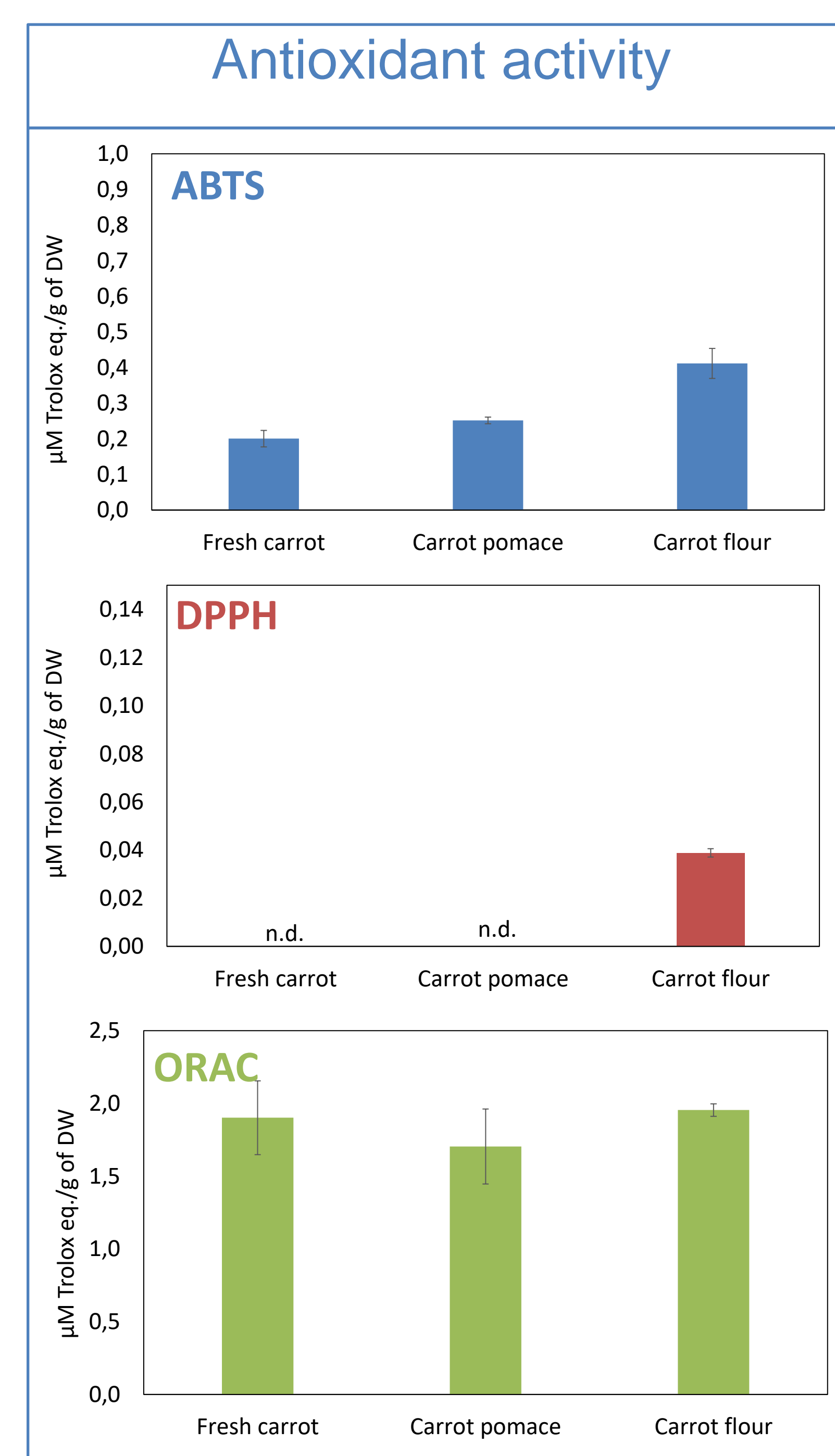
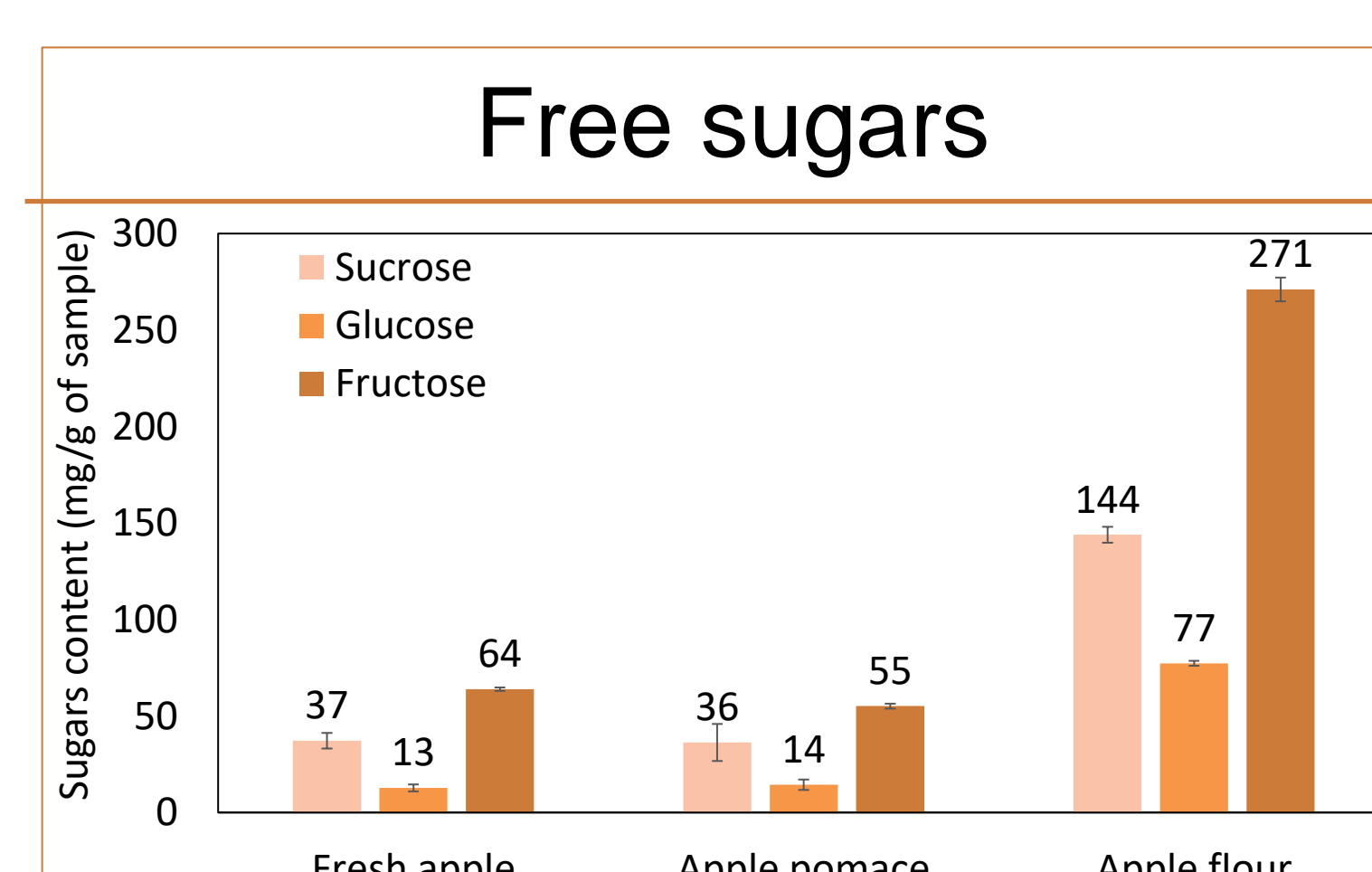
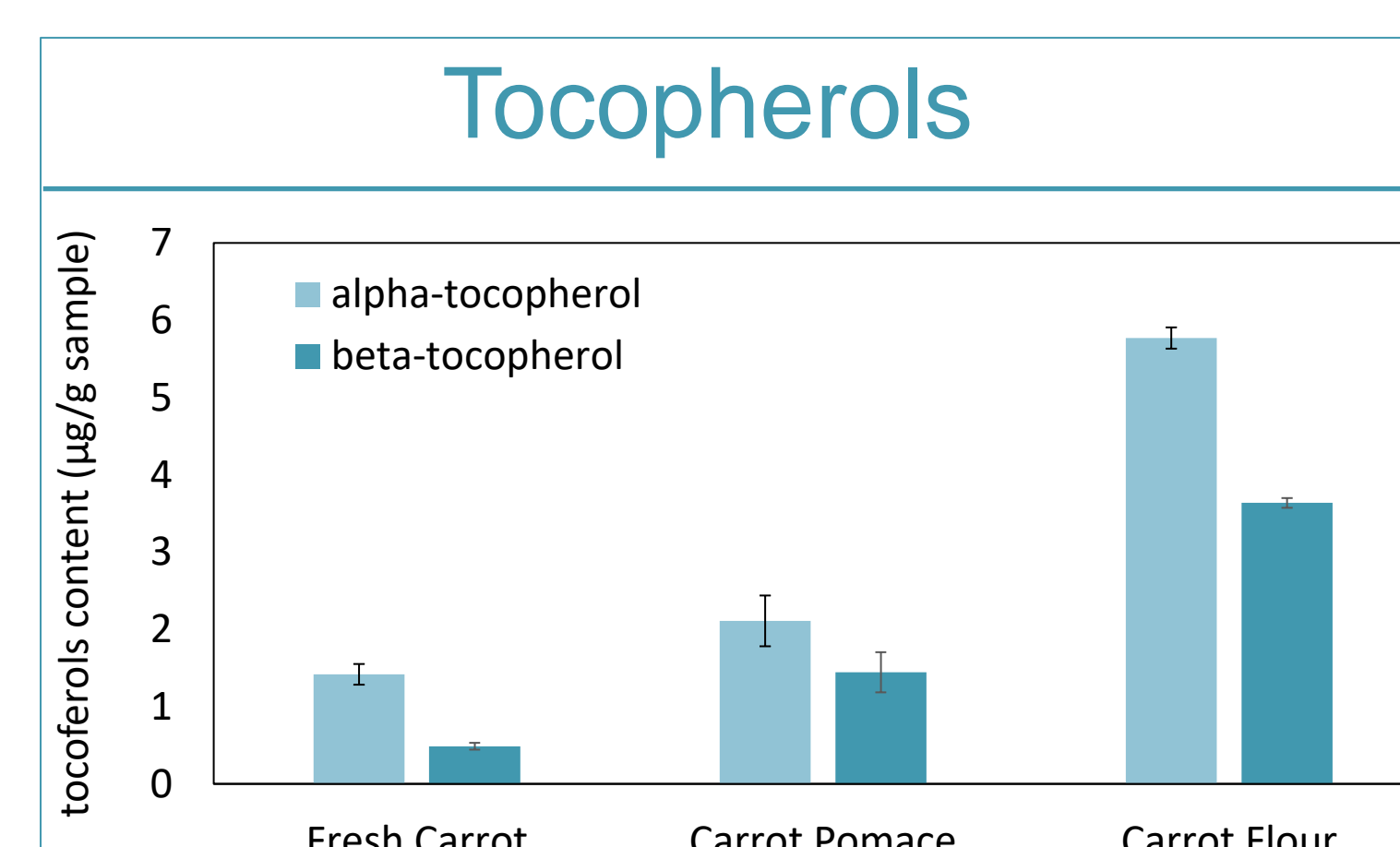
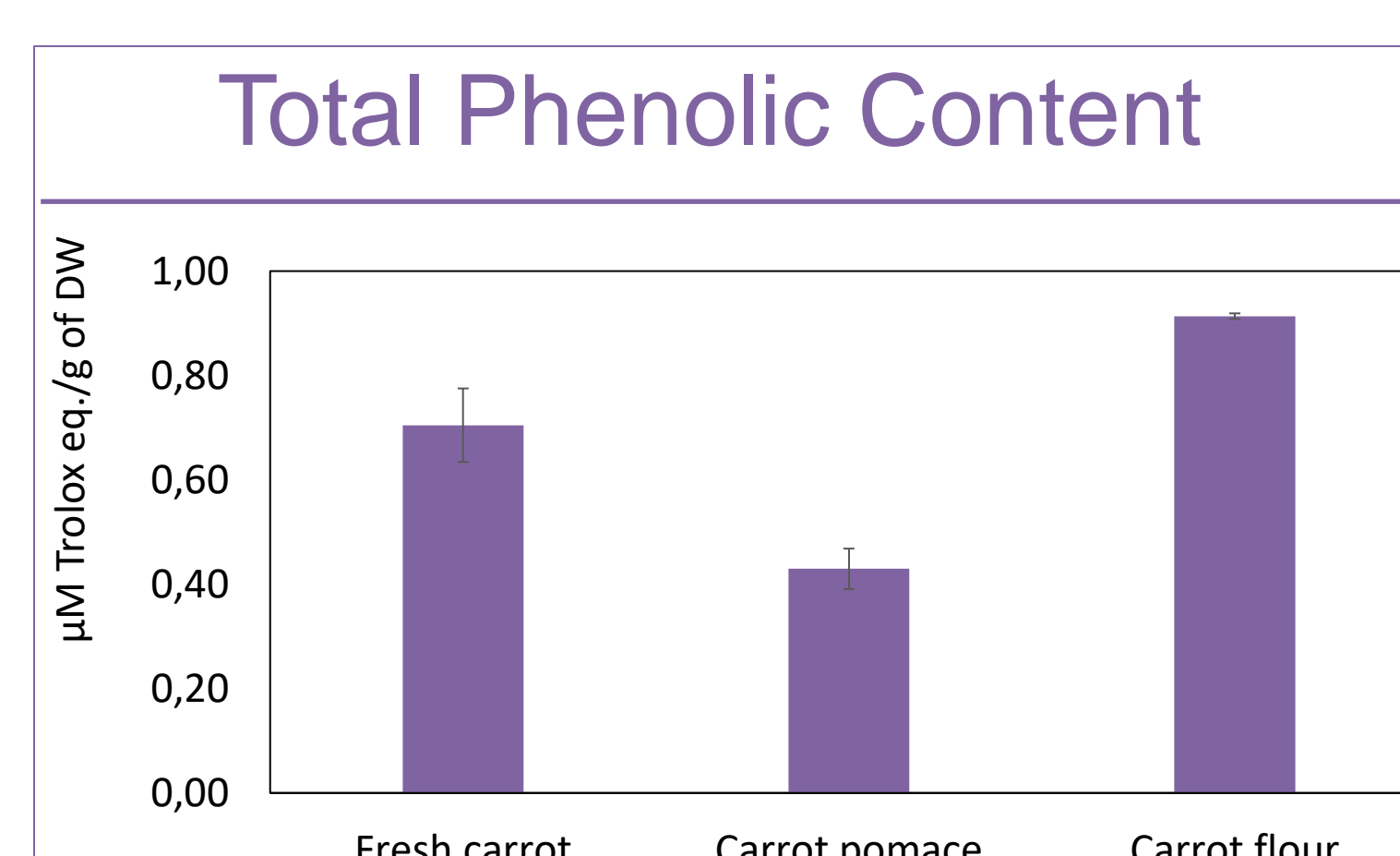
Methods and Results

Carrot flour production



Nutritional composition	
Moisture	8.4 ± 0.1 %
Ash	6.97 ± 0.05 %
Fat	1.89 ± 0.01 %
Protein	8.4 ± 0.2 %
Total carbohydrates	74.4 ± 0.1 %
Total dietary fibre	51.6 ± 0.0 %
Insoluble dietary fibre	36.4 ± 0.3 %
Soluble dietary fibre	15.1 ± 0.3 %
Sugars (sucrose, glucose and fructose)	302.23±19.12 mg sugars/g of flour

Carrot flour characterization



Conclusions

These results showed that carrot flour is rich in fibre and bioactive compounds such vitamin E and carotenoids associated to antioxidant effect. Thus, transforming carrot by-products into flour can be an effective way to valorise these by-products once these flours can be used as added-value ingredients, for instance, to increase fibre content in foods.

References

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- ³ Cilli, L. P.; Contini, L. R. F.; Sinnecker, P.; Lopes, P. S.; Andreo, M. A.; Neiva, C. R. P.; Nascimento, M. S.; Yoshida, C. M. P.; Venturini, A. C., *Effects of grape pomace flour on quality parameters of salmon burger*. Journal of Food Processing and Preservation 2019, e14329.

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