

# DRYING TREATMENT EFFECTS ON ANTHOCYANINS OF ORGANIC RASPBERRY (CV. HERITAGE) FRUIT



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## INTRODUCTION

Raspberry fruits are among the most frequently consumed berries in the world as fresh and processed into various products like preserves, jam, jelly, puree, bakery products, frozen products, dried products, juices, extracts, ice cream and yogurt [1]. In addition, raspberries are an excellent source of anthocyanins, a class of phenolic compounds, which are responsible for the red to purple color of the raspberry fruit.

The use of anthocyanin extracted from natural sources as food additives is a challenging process due to their low stability [2]. Drying is the most common food preservation process who help to provide products of higher shelf life [3]. Hot-air drying is the conventional drying method, which provides drastically reduction of quality of dried products [4]. By contrast, freeze drying is one of the best methods to preserve flavor, color and nutritional compounds due the absence of water, low pressure and temperature [3].

**Aim:** to compare the effects of two drying processes, hot-air drying and freeze drying, on total anthocyanin content of organic raspberry (cv. *Heritage*) fruits as measured by spectrophotometric method and UPLC technique.

## METHODOLOGY

### Organic raspberry fruits (cv. *Heritage*)

- from the farm "Livada de Zmeura" in second year of conversion to organic production



Fresh (F) and milled (M) fruits

### Drying treatments

#### Hot-air dehydration (HAD)

- at 70 °C



Excalibur 9 dehydrator

#### Freeze drying (FD)

- at -55 °C for 45 h



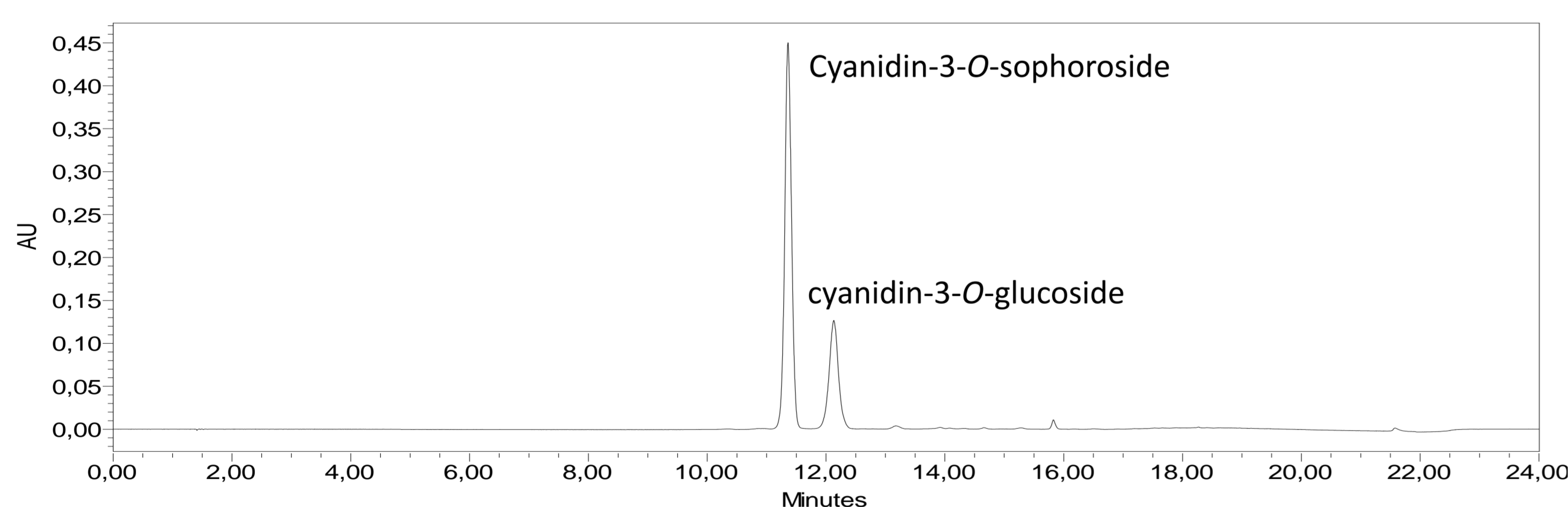
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### Determination of anthocyanins content

- Total anthocyanin content (TAC) by pH differential method**
  - acidified methanolic (1% HCl, v/v) extracts
  - vis. spectroscopy at 530 and 700 nm for extracts diluted in pH 1.0 and pH 4.5 buffers
  - Specord 210 Plus UV/VIS spectrophotometer
- Anthocyanins content (AC) by UPLC-PDA analysis**
  - purification of anthocyanins by solid-phase adsorption
  - separation performed at 520 nm
  - Waters ACQUITY UPLC chromatograph (Waters, Milford, MA) equipped with an UV-PDA detector

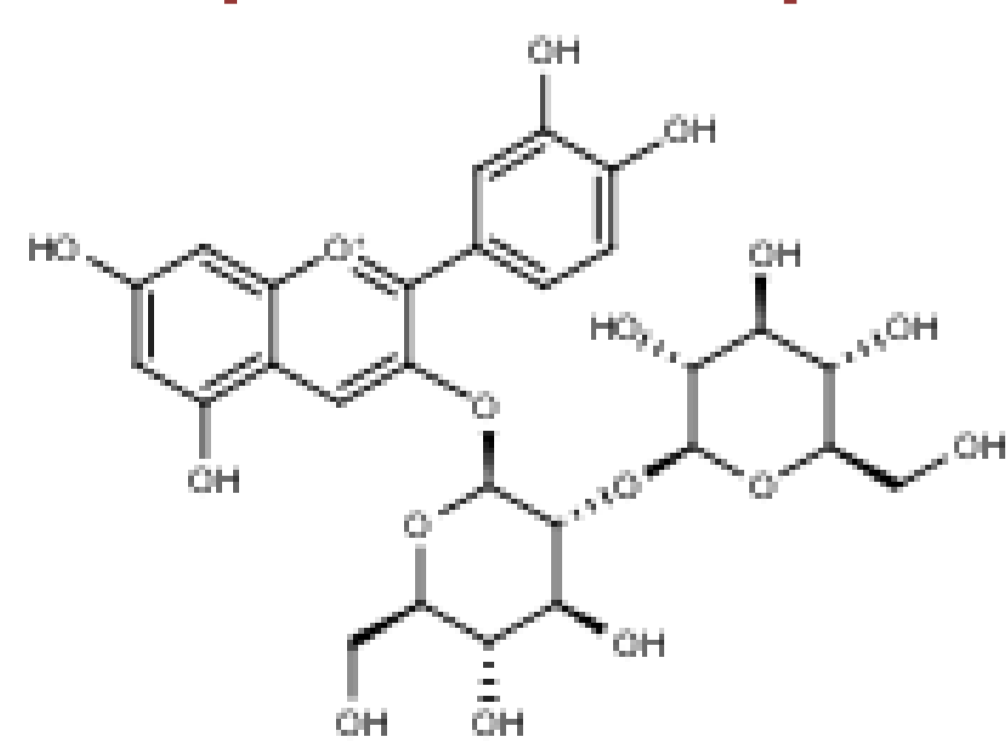
## RESULTS AND DISCUSSIONS

### Chromatographic profile of anthocyanins of raspberries at 520 nm

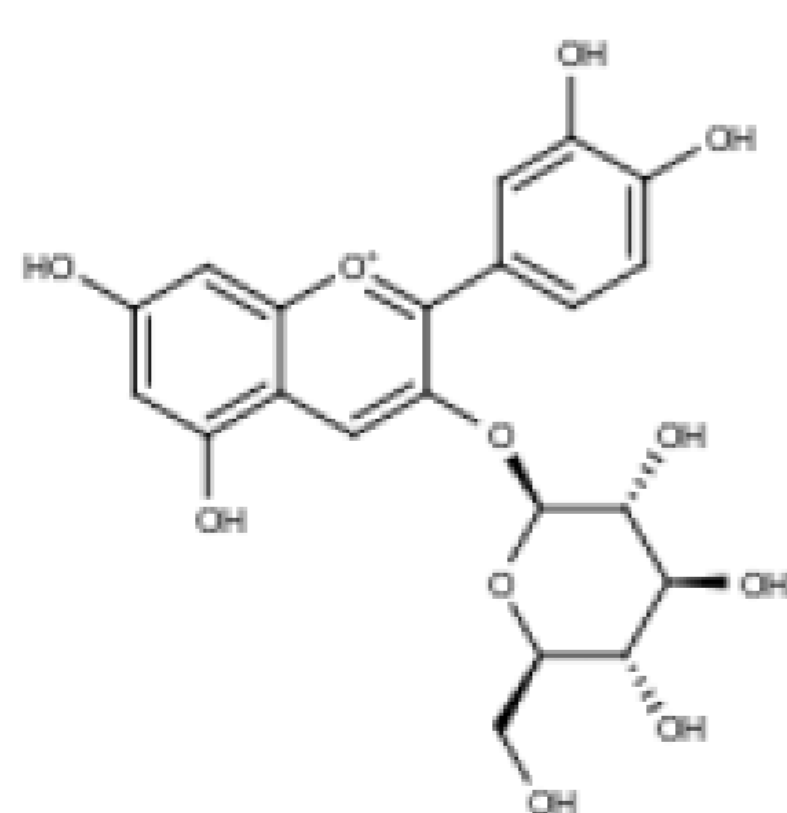


- Similar anthocyanin profiles were found for all raspberry samples tested.

### Representative phenolic compounds in raspberries

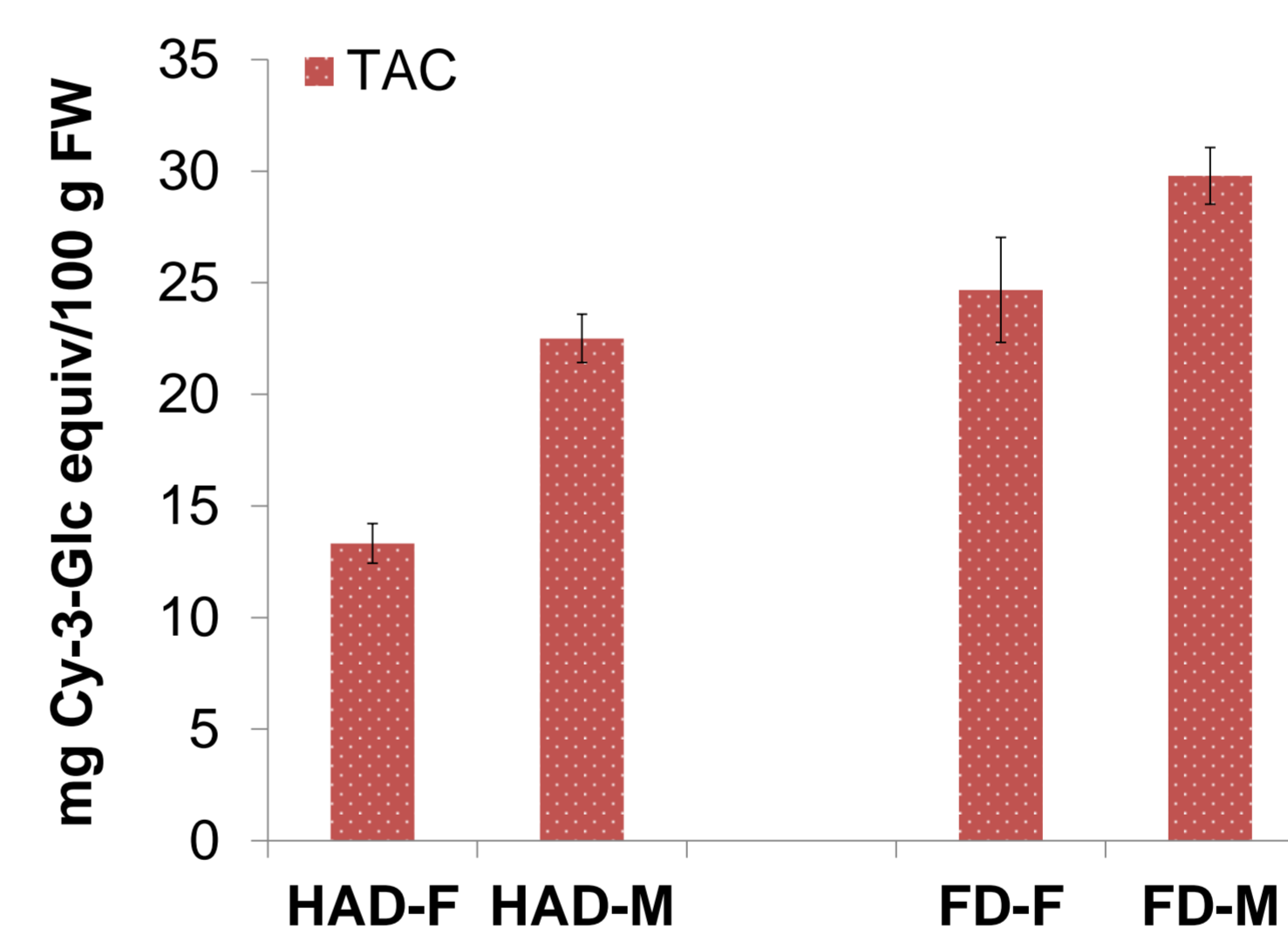


Cyanidin-3-O-sophoroside



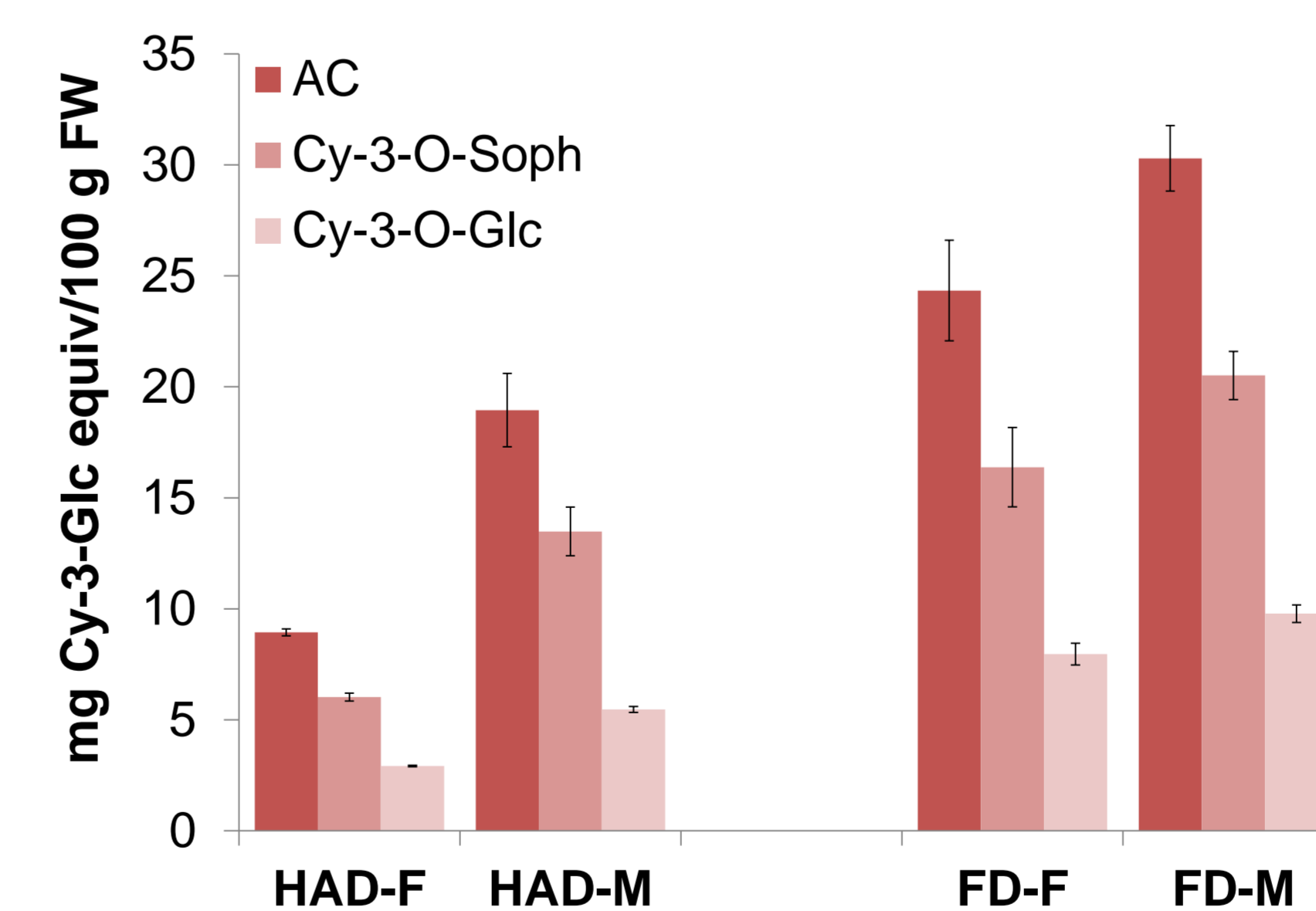
Cyanidin-3-O-glucoside

### Effects of drying on raspberry anthocyanins content



- In both fresh and milled raspberries, FD provided high amounts of anthocyanins in all samples than HAD, whatever was the method of quantification.

- There was no difference in TAC and AC for both fresh and milled FD raspberries.



- The raspberries milled before drying had higher TAC and AC fresh samples.

- Cyanidin-3-O-sophoroside was the predominant anthocyanin in all raspberry samples representing 67-71% of the AC and had found in high concentration in FD raspberries compared to HAD samples.

HAD-F: Hot-air dried fresh raspberries. HAD-M: Hot-air dried milled raspberries. FD-F: Freeze dried fresh raspberries. FD-M: Freeze dried milled raspberries.

## CONCLUSIONS

- Freeze drying was more effective in extraction of anthocyanins than hot-air drying. Processing such as milling before drying resulted in higher anthocyanin contents.
- Given these results, organic raspberries are valuable raw material for the development of innovative natural pigments such as anthocyanins.
- However, new data are necessary on other quality parameters of organic raspberry to understand better the effects of different drying treatments.

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