

## Analytical characterization of polyphenols and antioxidant activity of *Vaccinium myrtillus* L. and *Prunus avium* L. fruit

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### Abstract

Anthocyanins are a class of natural compounds well distributed in the plant kingdom. These polyphenols are indeed present in various flowers and fruits, in particular in the red-violet ones. Both *Vaccinium myrtillus* L. (bilberry) and *Prunus avium* L. (sweet cherry) fruits represent a valuable source of these bioactive compounds. Nowadays, anthocyanins are gaining an increasing attention for their biological activities, the most interesting one being their high antioxidant property. In this view, the development of efficient analytical methods for their characterization, together with the establishment of suitable extraction procedures, are crucial features in order to highlight the great nutraceutical potential of both bilberry and sweet cherry fruit extracts.

In the light of all the above, the aim of the present study was the development of a new analytical methods for the comprehensive analysis of polyphenols in bilberry and sweet cherry fruits. In particular, RP-HPLC-UV/DAD and HPLC-ESI-MS2 methods were successfully optimized and applied to different bilberry and sweet cherry fruit samples for their chemical characterization. As for anthocyanins, fourteen compounds, including 3-O-glucosides, galactosides and arabinosides of the anthocyanidins delphinidin, cyanidin, petunidin, peonidin and malvidin, were identified in bilberry fruits. For what concerns sweet cherry, four anthocyanins were detected the fruit extracts, with cyanidin-3-O-rutinoside being the most abundant one, followed by cyanidin-3-O glucoside and the 3-O-rutinosides of peonidin and pelargonidin.

The extracts obtained from these fruits were submitted to in vivo antioxidant assays by using the *Caenorhabditis elegans* model to test their capacity to increase the worm resistance to oxidative and thermal stress, in collaboration with the research group of Prof. Celestino Santos-Buelga of the Faculty of Pharmacy of the University of Salamanca (Spain). Both bilberry and sweet cherry extracts highly rich in anthocyanins were able to exert their anti-oxidant activity at a concentration of 5 µg/mL. The bilberry extract was found to possess a protective effect in the worms, since it induced a slight increase in their resistance against stress in both young and older worms. Sweet cherry anthocyanin extract was able to improve worm resistance against thermally-induced oxidative stress, especially in young nematodes.

Overall, this study highlights the great potential of red fruit extracts in the prevention of pathologies related to oxidative stress.

### Biography

Virginia Brighenti graduated in 2013 in Pharmaceutical Chemistry and Technology at the Department of Life Sciences of the University of Modena and Reggio Emilia. In 2018, she got a PhD degree in Clinical and Experimental Medicine. Currently she covers a post-doctoral fellowship position in Medicinal Chemistry at the Department of Life Sciences of the University of Modena and Reggio Emilia. Her research activity mainly focused on the development of innovative techniques for the extraction and analysis of bioactive natural products and on the isolation of new bioactive compounds of natural origin with antioxidant and antiproliferative activity. She is the author of 15 papers in ISI indexed international journals, and more than 20 congress communications (oral and poster).

### Publications

1. Chemical composition, antifungal and antiproliferative activities of essential oils from *Thymus numidicus* L
2. Assessment of the In Vivo Antioxidant Activity of an Anthocyanin-Rich Bilberry Extract Using the *Caenorhabditis elegans* Model
3. Innovative methods for the preparation of medical Cannabis oils with a high content in both cannabinoids and terpenes
4. The Effect of Polyphenols on Pomegranate Fruit Susceptibility to *Pilidiella granati* Provides Insights into Disease Tolerance Mechanisms
5. Chemical Characterization and Evaluation of the Antibacterial Activity of Essential Oils from Fibre-Type Cannabis sativa L. (Hemp)
6. Botanical Sources, Chemistry, Analysis, and Biological Activity of Furanocoumarins of Pharmaceutical Interest

10<sup>th</sup> World Congress on Chemistry & Medicinal Chemistry | Rome | Italy | 28-29 February, 2020

Abstract Citation: Virginia Brighenti, *Analytical characterization of polyphenols and antioxidant activity of Vaccinium myrtillus L. and Prunus avium L. fruit*, Chemistry 2020, 10<sup>th</sup> World Congress on Chemistry & Medicinal Chemistry, Rome, Italy, 28-29 February, 2020, 31