



SAPIENZA  
UNIVERSITÀ DI ROMA



EU FT-ICR MS

# Untargeted metabolomic profiling of Goji berries and leaves (*Lycium barbarum* L.) by FT-ICR MS

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# The super fruit: Goji berries



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Goji berry (*Lycium* species) have gained enormously importance in western world becoming one of the “*superfood*” due to their beneficial properties for health or well-being.

Choose of samples



EU FT-ICR MS

Unripe

berries

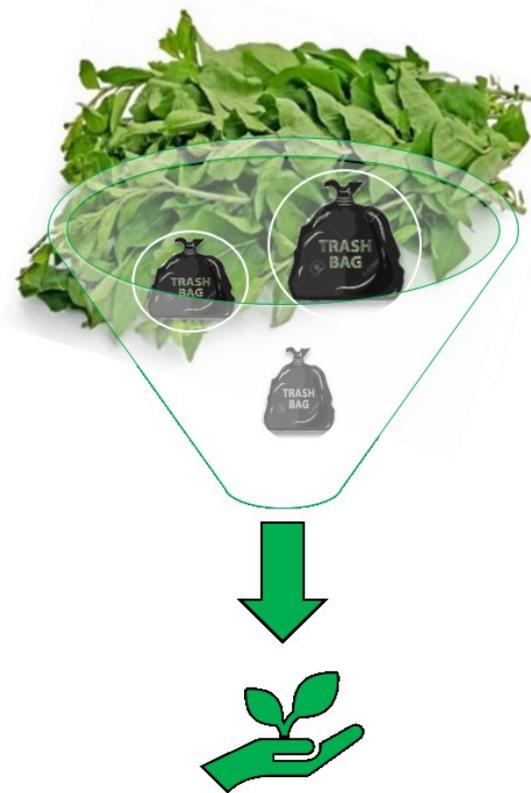


2018

2017



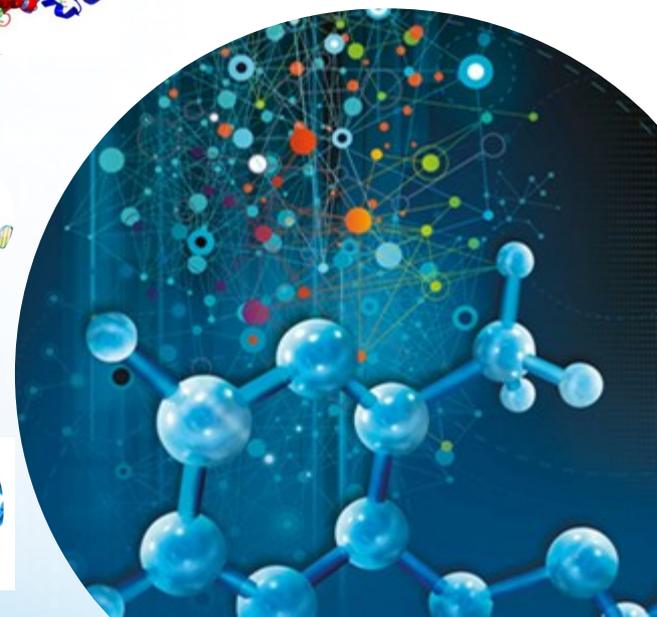
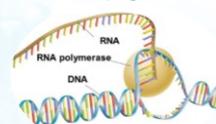
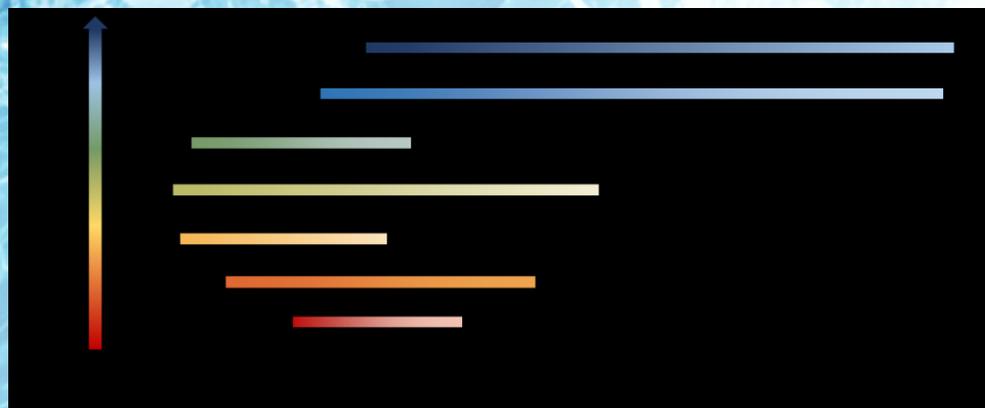
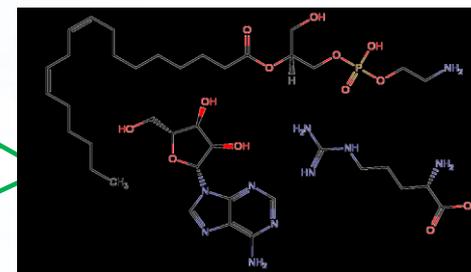
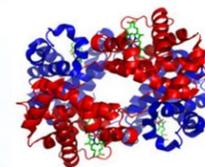
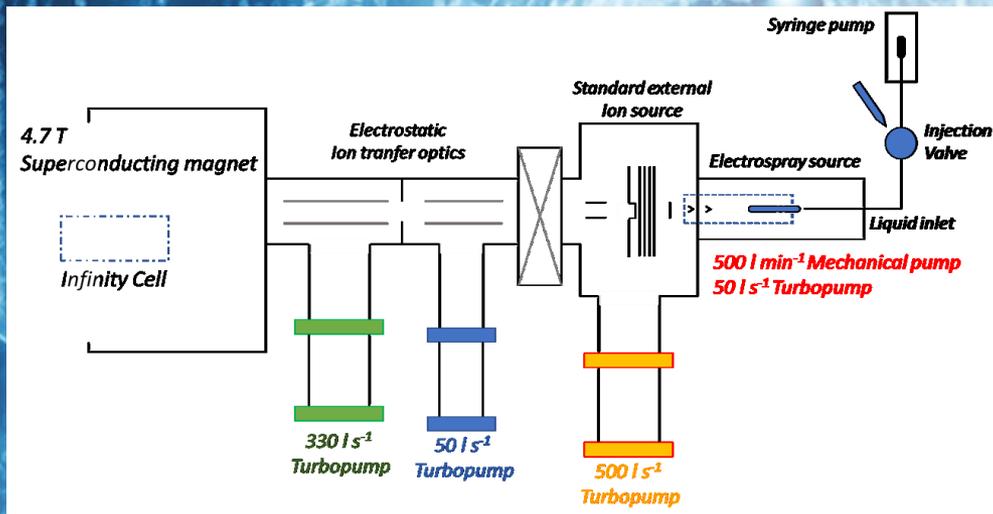
Ripe



# The high versatility of FT-ICR MS in metabolomics



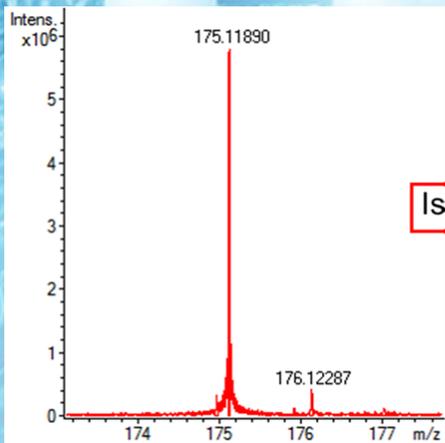
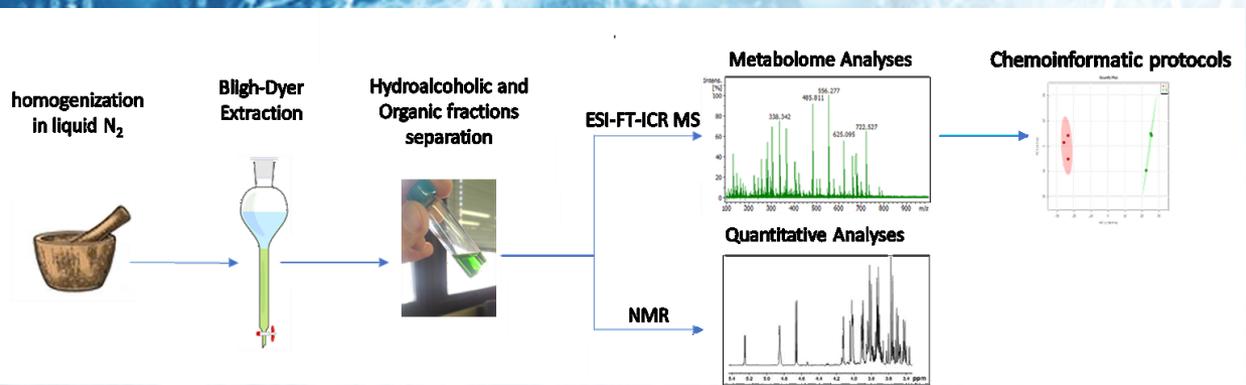
## EU FT-ICR MS



# Analytical Workflow

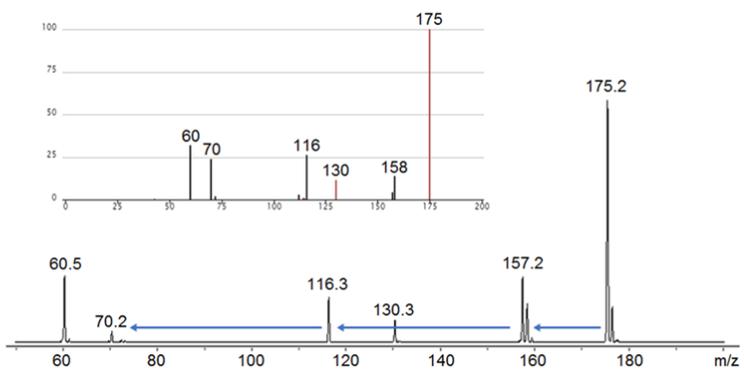


## EU FT-ICR MS



Isotopic Pattern

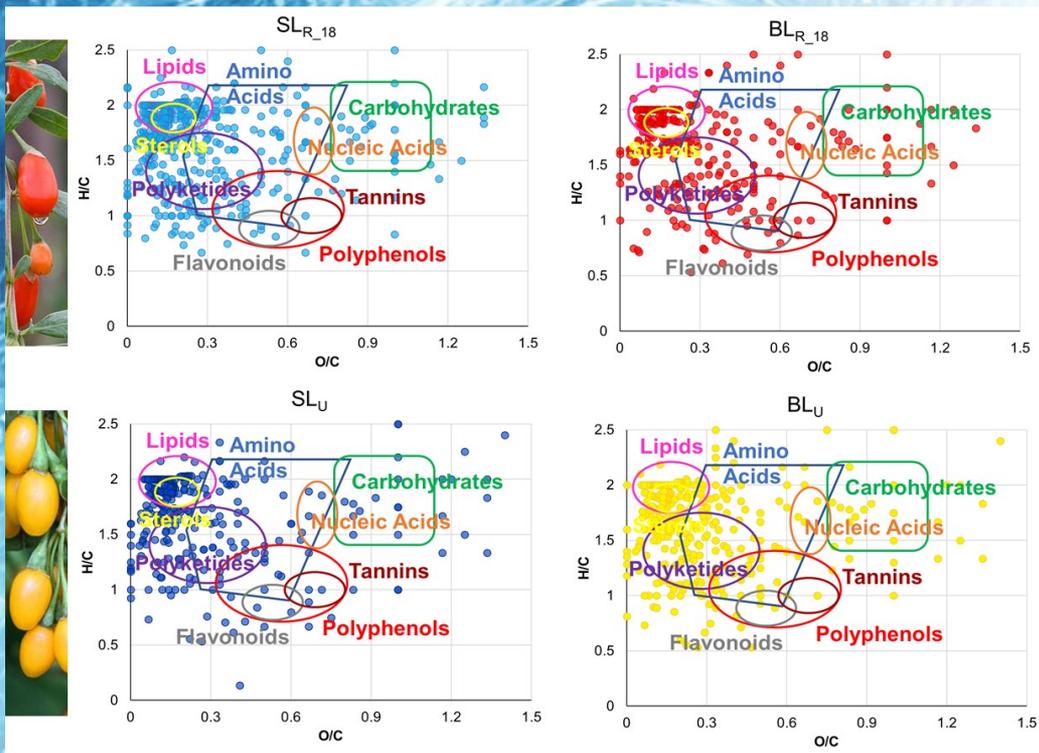
CID



# Qualitative composition of Goji berries



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| Extract             | Hydroalcoholic <sup>a</sup> |               | Organic <sup>b</sup> |               |
|---------------------|-----------------------------|---------------|----------------------|---------------|
|                     | Ion Mode                    | Identified MF | Ion Mode             | Identified MF |
| BL <sub>R</sub> _17 | ESI(+)                      | 119           | ESI(+)               | 72            |
|                     | ESI(-)                      | 121           | ESI(-)               | 38            |
| BL <sub>R</sub> _18 | ESI(+)                      | 93            | ESI(+)               | 55            |
|                     | ESI(-)                      | 115           | ESI(-)               | 66            |
| BL <sub>U</sub> _18 | ESI(+)                      | 212           | ESI(+)               | 77            |
|                     | ESI(-)                      | 74            | ESI(-)               | 48            |
| BL <sub>E</sub> _18 | ESI(+)                      | 116           | ESI(+)               | 74            |
|                     | ESI(-)                      | 65            | ESI(-)               | 62            |
| SR <sub>R</sub> _17 | ESI(+)                      | 93            | ESI(+)               | 112           |
|                     | ESI(-)                      | 56            | ESI(-)               | 99            |
| SR <sub>R</sub> _18 | ESI(+)                      | 168           | ESI(+)               | 115           |
|                     | ESI(-)                      | 117           | ESI(-)               | 40            |
| SR <sub>U</sub> _18 | ESI(+)                      | 90            | ESI(+)               | 104           |
|                     | ESI(-)                      | 83            | ESI(-)               | 53            |
| Leaves              | ESI(+)                      | 286           | ESI(+)               | 202           |
|                     | ESI(-)                      | 100           | ESI(-)               | 84            |

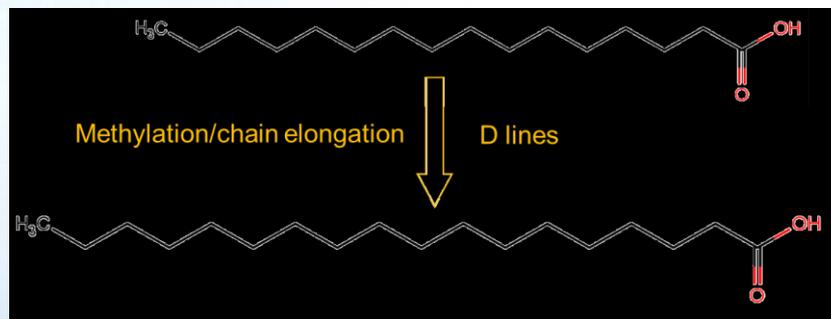
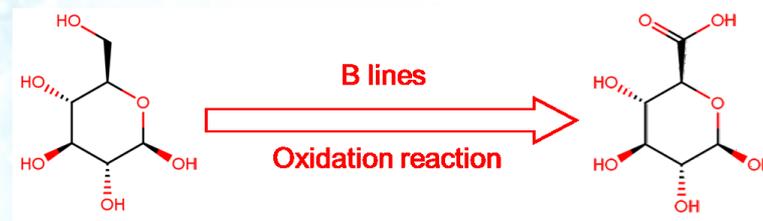
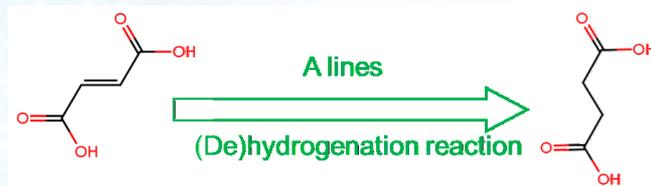
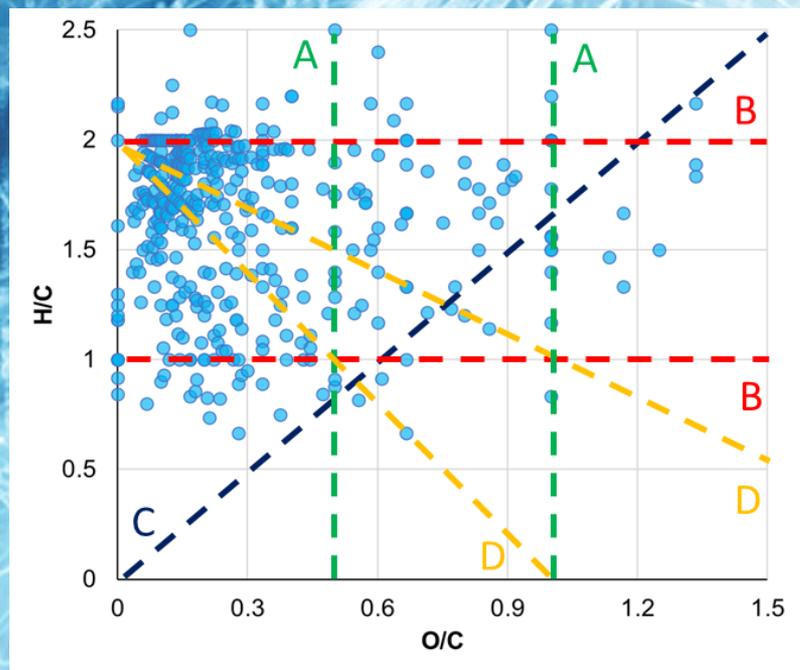
<sup>a</sup> Investigated by means of ESI FT-ICR MS.

<sup>b</sup> Investigated by means of ESI Ion trap MS.

# Qualitative composition of Goji berries



EU FT-ICR MS

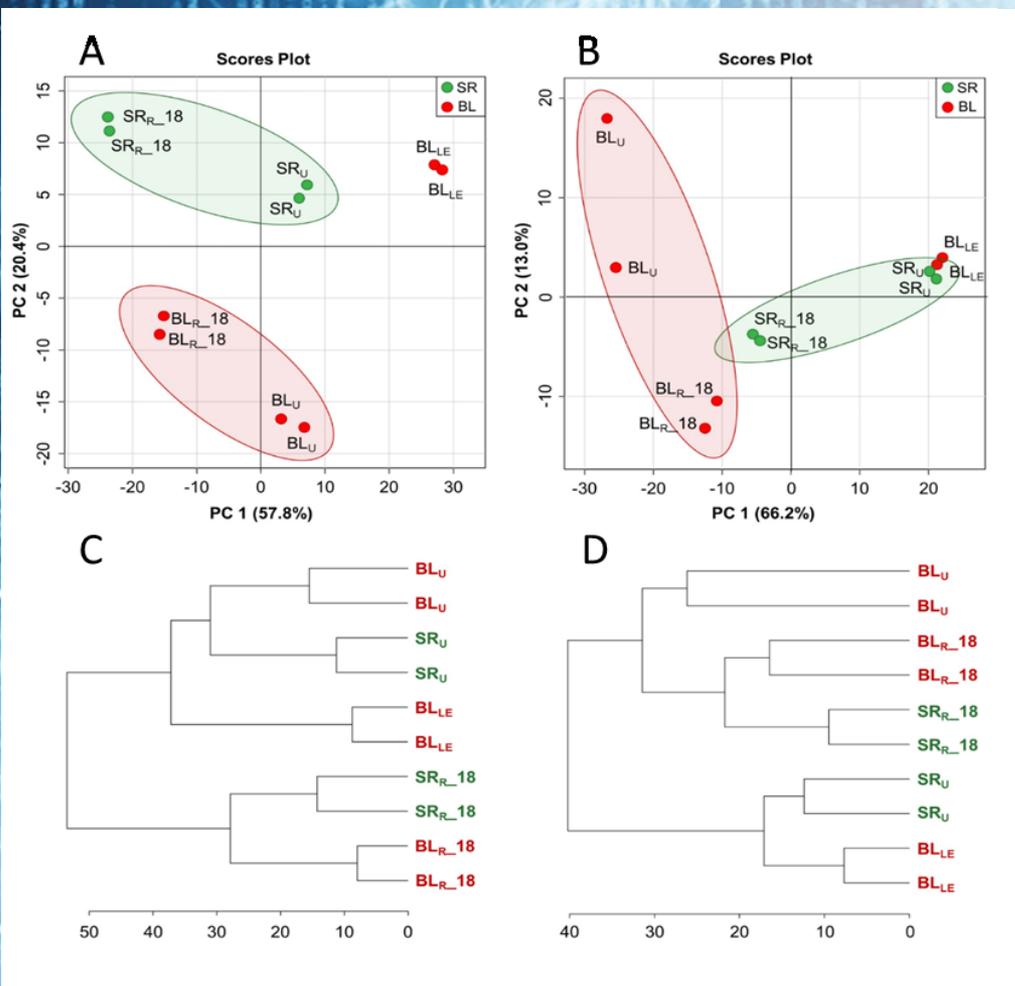


# Clusterization of results

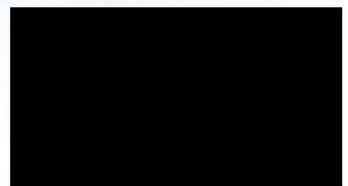


EU FT-ICR MS

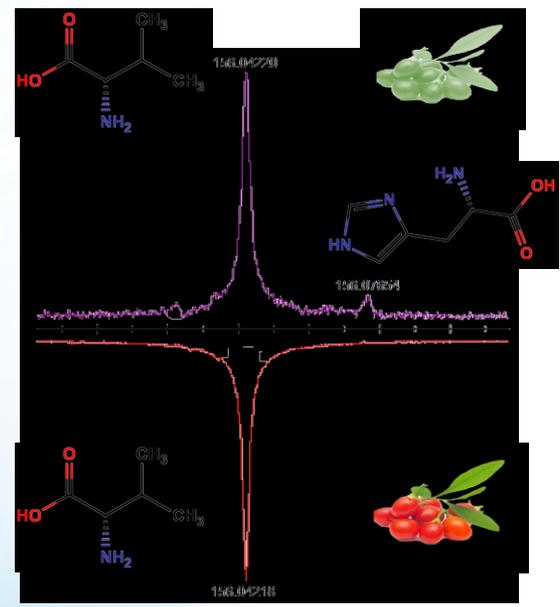
Effect of ripeness



i)



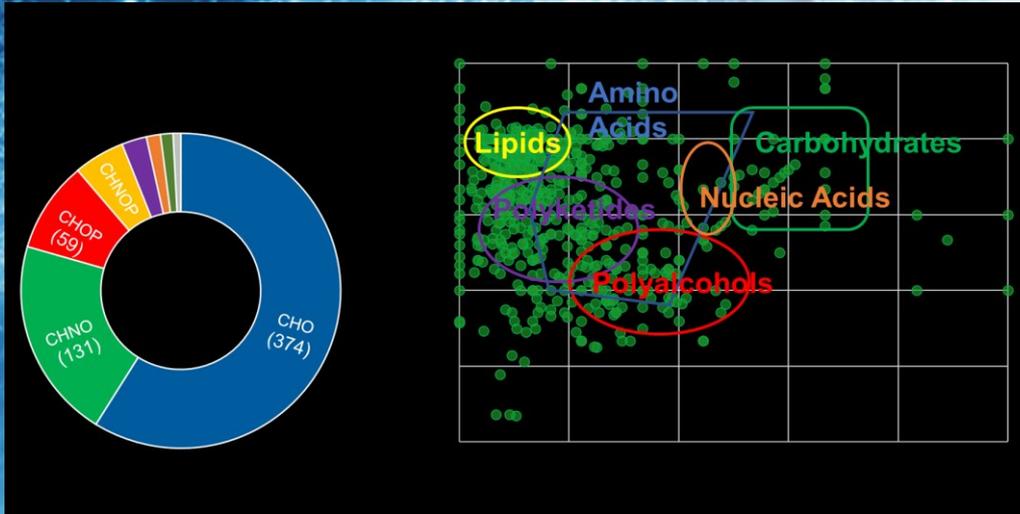
ii)



... and finally, leaves!!!!



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Hydroxycinnamic acids



Flavonoids

Polyalcohols

- ✓ Radical scavenging
- ✓ UV protective
- ✓ Anti-inflammatory

## Conclusion



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Article

### Metabolomic Profiling of Fresh Goji (*Lycium barbarum* L.) Berries from Two Cultivars Grown in Central Italy: A Multi-Methodological Approach

Mattia Spano <sup>1,\*</sup>, Alessandro Maccelli <sup>1,\*</sup>, Giacomo Di Matteo <sup>1</sup>, Cinzia Ingallina <sup>1</sup>, Mariangela Biava <sup>1</sup>, Maria Elisa Crestoni <sup>1,\*</sup>, Jean-Xavier Bardaud <sup>2</sup>, Anna Maria Giusti <sup>3</sup>, Alessia Mariano <sup>4</sup>, Anna Scotto D'Abusco <sup>4</sup>, Anatoly P. Sobolev <sup>5,\*</sup>, Alba Lasalvia <sup>1</sup>, Simonetta Fornarini <sup>1</sup> and Luisa Mannina <sup>1</sup>

*Molecules* **2021**, *26*, 5412. <https://doi.org/10.3390/molecules26175412>

**Don't forget to read  
our last article!!!**

- ESI FT-ICR MS has been exploited offering a fast, sensitive, and reproducible assay without the usage of any chromatographic method.
- The obtained results confirmed the rich composition in bioactive compounds (carotenoids, polyphenols, etc.) of Goji berries who give them beneficial properties for health or well-being.
- The study highlights the presence of antioxidant compounds in Goji leaves making them a promising source in the pharmaceutical, food, and cosmetic fields.

# Acknowledgement



EU FT-ICR MS



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Prof. Luisa Mannina

Dr. Davide Corinti

Alba Lasalvia

Valentina Lilla

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