



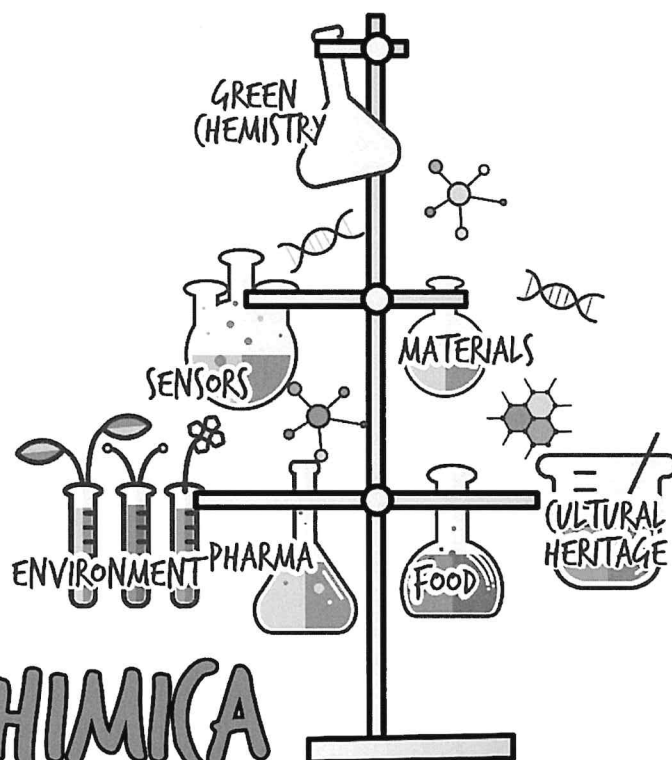
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# CHIMICA SOTTO L'ALBERO

I GIOVANI E LA CHIMICA: TEMI E SFIDE  
PER LE INNOVAZIONI DEL PROSSIMO FUTURO

*Book of Abstracts*

# The Double Face of Goji Berries: Nutraceuticals Versus Allergens Through Untargeted HRMS/ MS

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In the last few years goji berry (*Lycium barbarum L.*) (GB) has gained increasing attention due to its high nutritional value and health benefits in humans. Indeed, GBs could be considered an excellent source of antioxidants, omega 3 and 6, bioactive and healing substances, and proteins. Anyway, despite its beneficial properties, GBs were found to trigger allergic reactions in sensitive individuals<sup>1,2</sup>. To date, the knowledge about the GBs proteins able to produce an immune response is still scarce and needs to be deepened considered the spread of this product among Western consumers.

Grounding on this, the present work aims to profile the metabolic and protein fraction of extract of GBs in order to provide an overview of the nutraceutical and allergic properties of this “superfood”.

Investigation on metabolic fraction was carried out by submitting GBs to a coarse extraction with a solution of water/methanol enriched with formic acid (1%) followed by a sonication step. GBs extracts were then analyzed by untargeted HPLC-HRMS/MS and metabolic compounds identified by processing MS spectra via Compound Discoverer™ (Thermo Fisher Scientific) commercial software.

Proteomic investigation was accomplished with the final aim to have more insight about proteins involved in immune response of allergic patients. Therefore, GBs proteins were firstly extracted according to *ad hoc* protocol<sup>2</sup> and then the total content estimated by colorimetric assay. The soluble protein fraction was then profiled by Tris-Glycine and Tris-Tricine SDS-PAGE in order to have a comprehensive view of high and low molecular weight (MW) GBs proteins. The most informative bands detected in SDS-PAGE and excised from the gel, along with the total GBs protein extract, were submitted to tryptic digestion to be then analyzed by untargeted HPLC-HRMS/MS followed by bioinformatics search for identification purpose.

Metabolomic analysis confirmed the high nutritional value of GBs, indeed several valuable compounds, such as polyphenols, alkaloids, vitamins, amino acids and fatty acids (mainly linoleic and alpha-linolenic acid), were found in the extract analysed. As for proteomic study, electrophoretic profiles (Tris-Glycine and Tris-Tricine SDS-PAGE) of GBs extract highlight different protein bands in the region of 48 kDa, 35-30 kDa, 21-23 kDa e 9 kDa MW with some of them attributed to allergen proteins after HPLC-MS/MS analysis and database searching (restricted to Eucotyledons). In details, proteins belonging to allergenic families such as vicilins, legumins, globulins and lipid transfer proteins are noteworthy (LTPs).

The present study contributes to deepen the knowledge about the chemical composition and protein profile of GBs, with particular attention to its allergenic properties. Anyway, more studies and chemical investigations are needed to better characterize this product and its high health properties.

**Keywords:** Goji berry, *Lycium barbarum*, emerging food allergens, metabolomics, proteomics.

## References

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2. Uasuf C.G., De Angelis E., Guagnano R., et al., *Biomolecules.* 10 (2020) pp. 689.