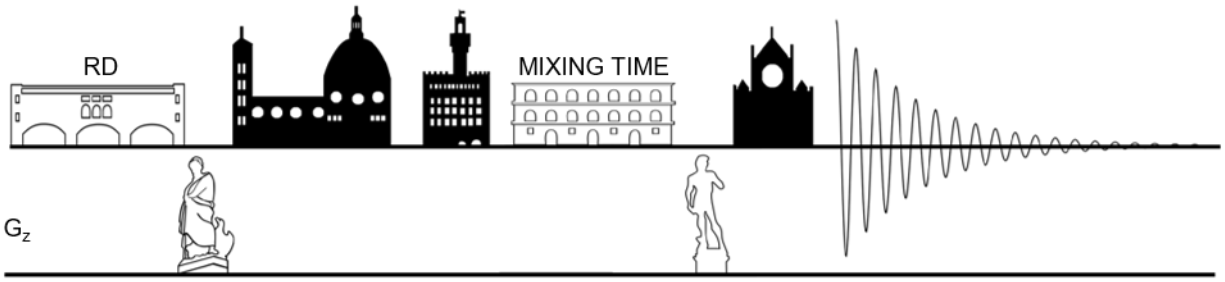
51st National Congress on Magnetic Resonance



September 4-6, 2024 | Florence

Building D4, University of Florence, Via delle Pandette 35, Florence

GIDRM
Gruppo Italiano Discussione Risonanze Magnetiche

Università degli Studi Firenze
Da un secolo, oltre.

51st National Congress on Magnetic Resonance

September 4-6, 2024 | Florence

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GENERAL INFORMATION

VENUE

Building D4 - Polo di Novoli
University of Florence
Via delle Pandette 35, 50127, Firenze

INVITED SPEAKERS

The following speakers have agreed to give plenary lectures at the meeting:

Maria Rosaria “Sasi” Conte - *King’s College London*

Dominik Kubicki - *University of Birmingham*

Mathilde Hauge Lerche - *Technical University of Denmark*

Claudio Luchinat - *University of Florence*

Alceo Macchioni - *University of Perugia*

Roberto Fattorusso, Winner of the GIDRM/GIRM Gold Medal 2024 – *University of Campania Luigi Vanvitelli*

The following keynote speakers have agreed to give lectures at the meeting:

Cristina Airoldi - *University of Milan Bicocca*

Francesca Cantini - *University of Florence*

Angelo Gallo - *University of Turin*

Cinzia Ingallina - *University of Rome La Sapienza*

Marilisa Leone - *CNR-IBB, Naples*

Alfonso Pedone - *University of Modena e Reggio Emilia*

Gabriele Stevanato - *University of Padua*

Claudia Testa - *University of Bologna*

POSTER SESSIONS

Poster session 1

Wednesday, September 4th, 16:05-17:00, ODD abstract numbers

Poster session 2

Thursday, September 5th, 10:30-11:20, EVEN abstract numbers

Poster session 3

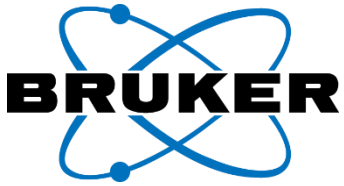
Thursday, September 5th, 12:50-14:10, ODD abstract numbers

Poster session 4

Thursday, September 5th, 16:10-17:30, EVEN abstract numbers

UNDER THE AUSPICES OF

GIDRM GRATEFULLY ACKNOWLEDGES ITS PARTNERS FOR FINANCIAL SUPPORT TO THE CONFERENCE



NOVEL CHARACTERIZATION OF PLANT-BASED BEVERAGES BY 1D AND 2D NMR.

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Keywords: solution NMR, small molecules, biomolecules, food.

Plant-based beverages (PBBs) are defined as emulsions obtained from different plant materials like legumes, cereals, pseudo-cereals, seeds, or nuts after the main steps of soaking, filtration, and thermal treatment. Naturally, they represent lactose-free options ideal for consumers with allergies or intolerance, and they possess environmental advantages compared to bovine milk, since the CO_2 fingerprint for their production is lower, their fiber content, and they favor animal welfare. They are also a staple food for those consumers that opt for new dietary habits such as veganism, vegetarianism, and flexitarianism [1,2]. In the last decade, efforts have been directed mostly towards their nutritional composition (in terms of macro and micronutrients), production processes, anti-nutritional factors (tannins, saponins, and enzyme inhibitors), their sensory acceptability, their protein availability, and the diversity of aroma-related compounds [1,3]. However, there is a large literature gap in the use of 1D, 2D NMR, and qNMR in the characterization of PBBs to gain deeper knowledge about their composition. The objective of this work was to characterize the polar extract of soy, oat, and almond PBBs by ^{1}H NMR, HSQC, and qNMR, using cow milk as a reference. ^{1}H NMR revealed that that the reference matrix was the one with the highest number of found compounds (68). The main chemical families were nitrogen compounds (excluding amino acids), carbohydrates, fatty acids, and organic acids. Then, soy PBB was the one closest to the reference in number of found and identified compounds, sharing fatty acids and carbohydrate signals but with distinct compounds like nucleosides, taurine, histidine, and histamine. Oat and almond PBBs showed around 30% less compounds (48 and 42, respectively) compared to the reference. Oat PBBs showed a richer carbohydrate profile with presence of mono, di, and oligosaccharides, especially maltose and raffinose. Almond PBB was the one with the lowest number of compounds among the 4 matrices, with pantothenate and *myo*-inositol as distinctive compounds. A total of 33 compounds were quantified, an analysis of variance with Tukey post-hoc test showed higher concentration of most organic acids and choline and its derivatives in cow milk. Soy PBB was enriched in compounds like stigmasterol and glucose-1-P, while oat PBB in beta-maltose, trigonelline, and valine. Finally, almond PBB showed significantly higher concentrations of tartrate, galacturonate, and malate.

References

[1] Hidalgo-Fuentes, B.; de Jesús-José, E.; Cabrera-Hidalgo et al., (2024). Plant-Based Fermented Beverages: Nutritional Composition, Sensory Properties, and Health Benefits. *Foods*, *13*, 844. https://doi.org/10.3390/foods13060844
[2] Popova, A.; Mihaylova, D. & Lante, A. (2023). Insights and Perspectives on Plant-Based Beverages. *Plants*, *12*, 3345. https://doi.org/10.3390/plants12193345
[3] Xie, A., Dong, Y., Liu, Z., Li, Z., Shao, J., Li, M. & Yue, X. (2023). A Review of Plant-Based Drinks Addressing Nutrients, Flavor, and Processing Technologies. *Foods*, *29*, 12(21):3952. https://doi.org/10.3390/foods12213952.