NMR METHODOLOGY IN THE STUDY OF ITALIAN LOCAL PRODUCTS

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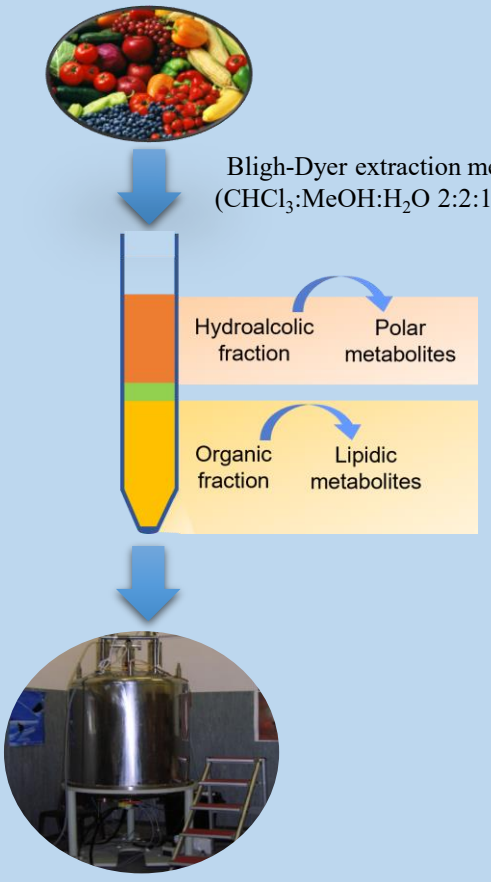
INTRODUCTION

In many Italian regions, local products are cultivated and used only for the local consumption. Therefore, many varieties and biodiversity tend to be lost due to the agronomic and commercial selection of only a few varieties, usually with high-yielding. In this context, high field NMR spectroscopy was applied to characterize and therefore valorize local Italian products namely tomatoes of Lazio region, apple typical cultivars of the Piedmont region and potatoes from Liguria and Piedmont regions.

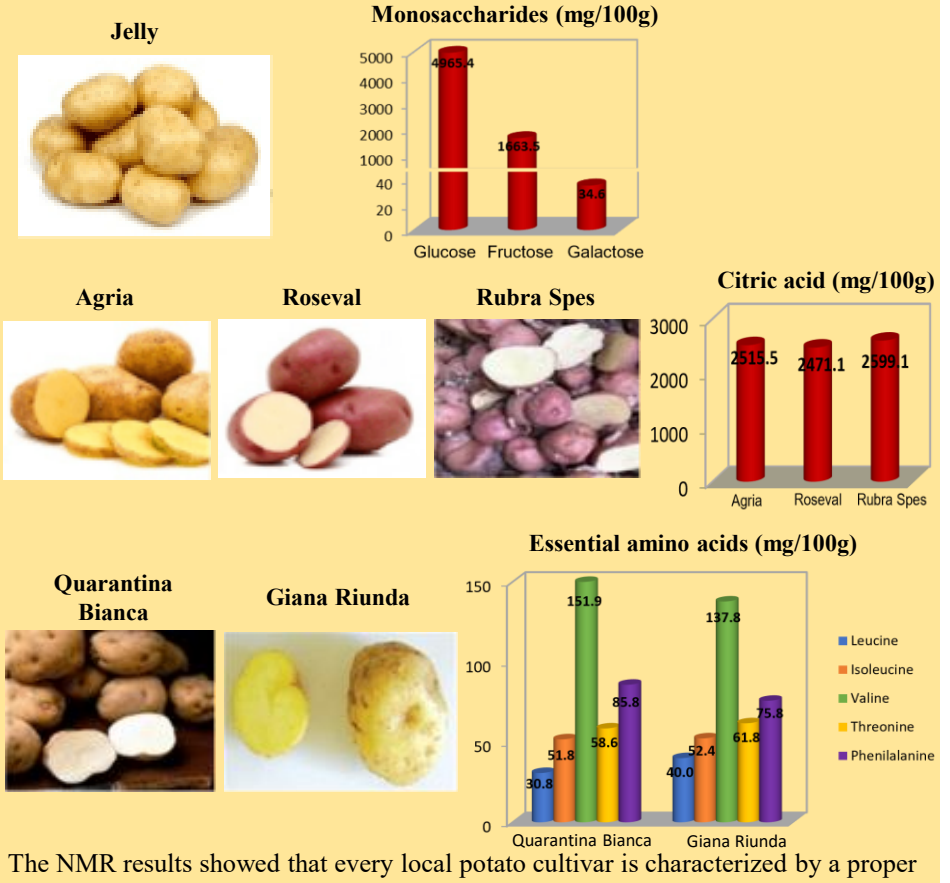
ANALITICAL PROTOCOL

Blight-Dyer extraction was performed obtaining organic and hydroalcoholic fractions then analyzed by the 1D and 2D NMR experiments.

The Bligh-Dyer method allowed to extract both polar and non-polar metabolites from the food matrices. NMR spectroscopy applied in the metabolomic field allows the identification and quantification of a large number of compounds in a single analysis.

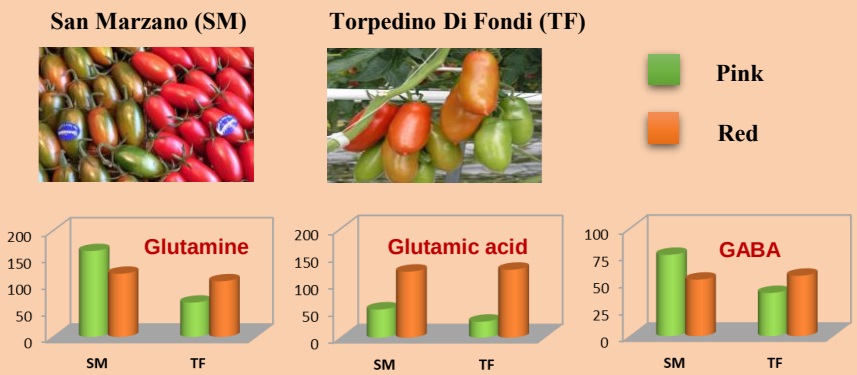


Potatoes: chemical profile characterization of some potato cultivars from Liguria and Piedmont regions to valorize their role in the food industries

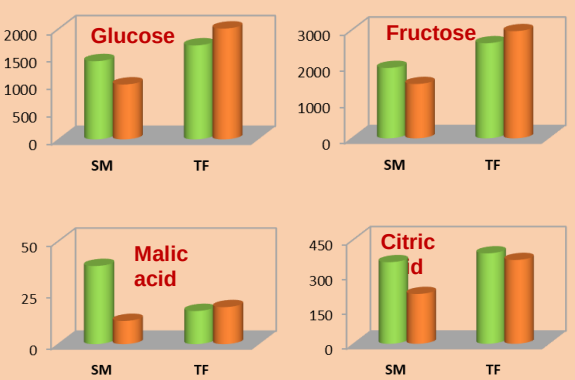


The NMR results showed that every local potato cultivar is characterized by a proper chemical profile.

Tomatoes: a comparison study of the new local Torpedino di Fondi cultivar with the traditional San Marzano cultivar from Lazio at two ripening stages



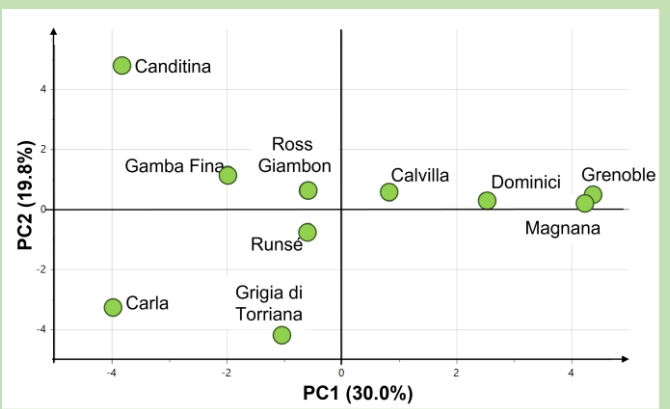
Glutamine was the most abundant amino acid in both cultivars at pink stage, followed by **glutamic acid** and **GABA**. At red stage, glutamic acid became the most abundant amino acid, accordingly with the typical ripening for all fruits.



Glucose and **fructose** contents in both TFs were higher than in SMs. Fructose and glucose levels increased in TF cultivar over the ripening period. The opposite trend was observed in SMs fruits.

Malic acid and **citric acid** content during ripening was constant in TF fruits and decreased in SM tomatoes.

Apples: metabolite profile of ten ancient apple cultivars from Piedmont region to highlight possible differences/similarities



Canditina

citramalic acid, *p*-coumaroyl moiety, total unsatured fatty acid, total satured fatty acid

xylose, fructose, sucrose, malic acid, citric acid, alanine, mono-unsatured fatty acid

Carla

fructose, xylose, quinic acid, lactic acid, acetic acid, formic acid

sucrose, chlorogenic acid, malic acid, asparagine, aspartate, alanine, malic acid, galacturonic acid

Magnana

Grenoble

sucrose, rhamnitol, malic acid, asparagine, alanine, phosphatidylcholine

p-coumaroyl moiety

The presented results show that every local variety has its own chemical profile responsible for the sensorial, nutritional, and health-related properties, and they may be used as sources of specific substances that are utilized as ingredients of health products, such as food supplements, functional foods, and cosmetics.

[1] C. Ingallina, A. Maccelli, M. Spano, G. Di Matteo, A. Di Sotto, A.M. Giusti, G. Vinci, S..Di Giacomo, M. Rapa, S. Ciano, F. Fraschetti, A. Filippi, G. Simonetti, C. Cordeiro, M.S. Silva, M.E. Crestoni, A.P. Sobolev, S. Fornarini and L. Mannina Antioxidants. 9, 1027 (2020)

[2] G. Di Matteo, M. Spano, C. Esposito, C. Santarcangelo, A. Baldi, M. Daglia, L. Mannina, C. Ingallina and A.P. Sobolev Foods. 10, 289 (2021)

[3] C. Ingallina, M. Spano, A.P. Sobolev, C. Esposito, C. Santarcangelo, A. Baldi, M. Daglia and L. Mannina. Foods 9, 1216 (2020)