NON-TARGETED NMR METHOD TO PRESERVE THE BIODIVERSITY OF AUTOCHTHONOUS LENTILS CULTIVATION

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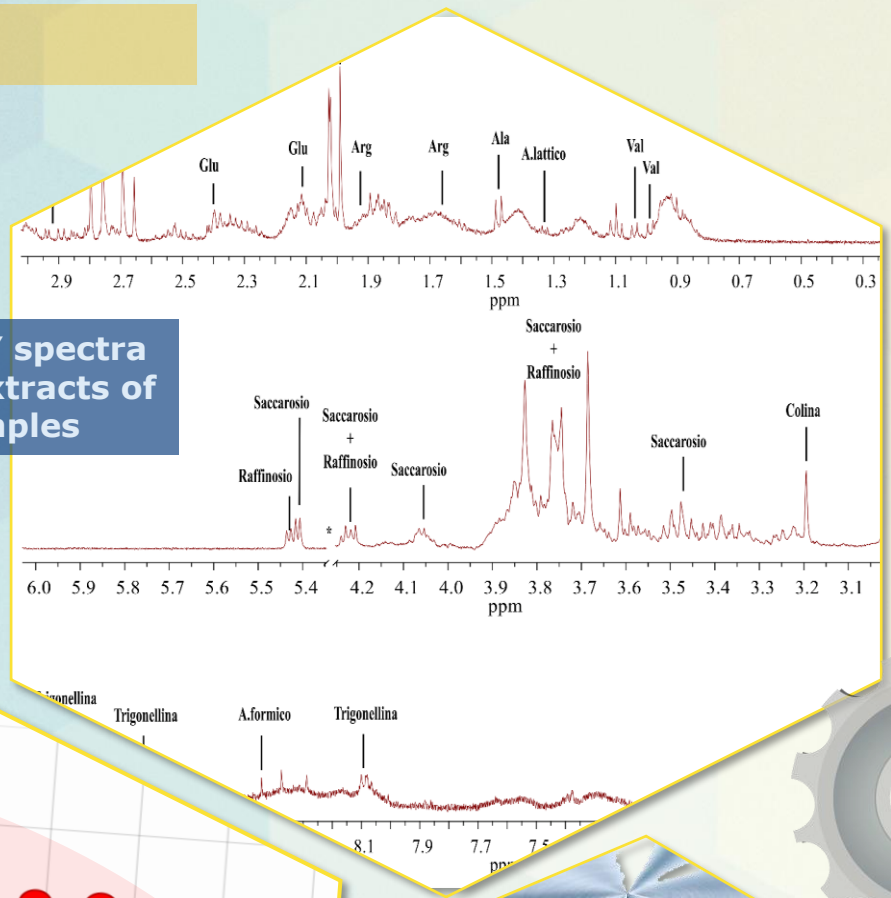
Introduction

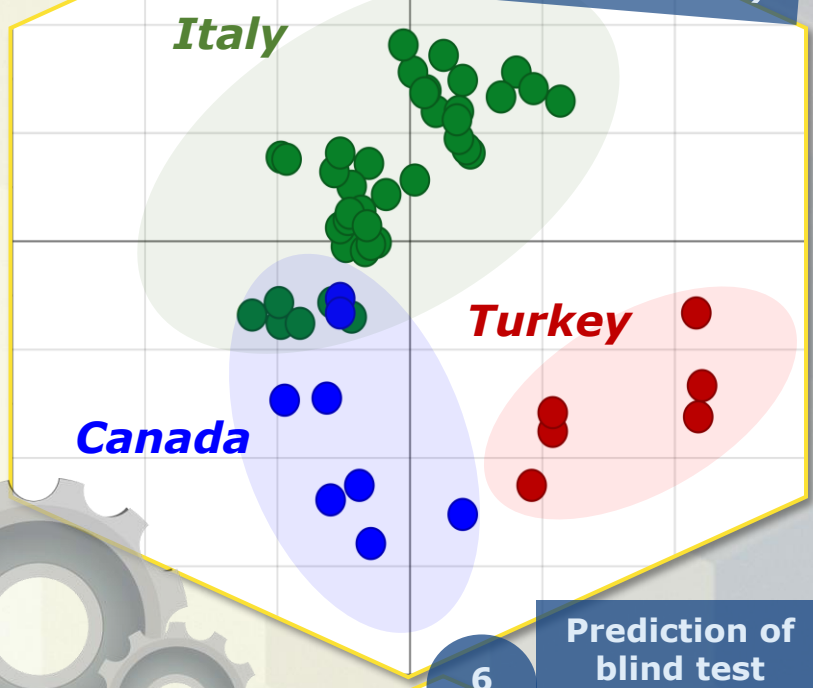
The Protected Geographical Indication (IGP) is an EU appellation of agricultural and food products. Recently, *Altamura Lentil* has received this denomination in order to protect and differentiate the quality of this typical local product.
Non-targeted NMR method has received growing attention as a rapid method for food authenticity assessment, because of its potential for identification of specific features of the products by data-driven classifiers [1,2].
Herein, we have applied the non-targeted approach to assess the authenticity of *Altamura Lentil* and identify the geographical origin, in such a way to valorize this product. Three geographical origin were considered, namely Italy, Canada and Turkey. Among the Italian samples, two subgroups were available: Altamura and Sicilian lentils.

Results

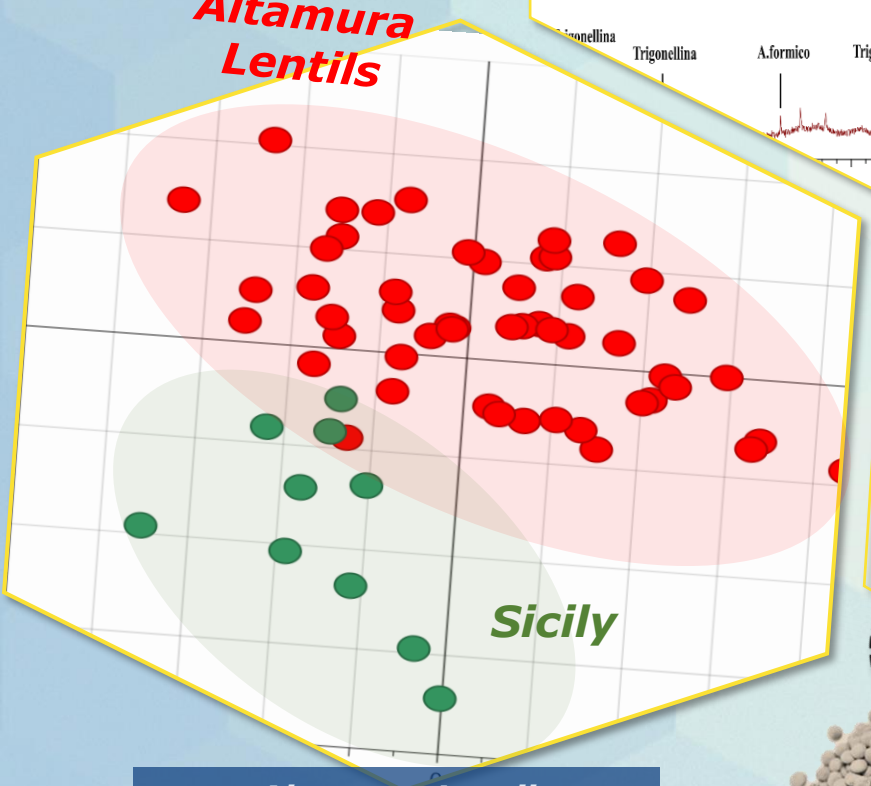
1 1D ^{1}H-NOESY spectra of aqueous extracts of lentil samples



2 Geographical origin traceability through chemometric analisys (PLS-DA, PC1 *vs* PC2)



3 *Altamura Lentil* discrimination through chemometric analisys (PLS-DA, PC1 *vs* PC2)



4 Database

5 Classifier

	Members	Correct	Italia	Canada	Turchia
Italia	114	100%	114	0	0
Canada	8	50%	3	4	1
Turchia	6	100%	0	0	6
Test set	46		21	23	2
Total	174	96,88%	138	27	9
Fisher's prob.	7e-16				

Satisfactory class prediction

6 Prediction of blind test samples

Blind sample

Conclusion

The classifier developed was capable of discriminating Lentil samples according to geographical origin; in particular, it distinguished lentils from Italy against imported ones (Canada and Turkey).
Within the class of Italian samples, a distribution according to the regional origin was observed, identifying *Altamura lentils* against those from Sicily. The resulting model was validated by blind test samples and demonstrated a good prediction capability (96.88%).
This approach has successfully demonstrated the power of Nuclear Magnetic Resonance to assess and valorize the authenticity of local food products.

References

[1] R. Ragone, S. Todisco, M. Triggiani, S. Pontrelli, M. Latronico, P. Mastrorilli, N. Intini, C. Ferroni, B. Musio, V. Gallo *Food Chemistry*, **332**, 127339 (2020).
[2] V. Gallo et al., *Food Analytical Methods*, **13**, 530–541 (2020).

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