

Evaluation of the Production Year in Italian and Chinese Tomato Paste for Geographical Determination Using O2PLS Models

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Nuclear magnetic resonance (NMR) is nowadays largely used as valid tool in metabolomic applications. In this study, the metabolite content of Italian and Chinese tomato paste at different concentration rates of two production years (2007 and 2008) was investigated with the aim of building a robust geographical differentiation statistical model. A total of 119 tomato paste samples were analyzed by ¹H NMR and multivariate data analysis tools, in particular using bidirectional orthogonal projection to latent structures–discriminant analysis (O2PLS–DA). This technique is well-suited for noisy and correlated variables and was recently adopted to obtain robust classification models, having a clear interpretation of the systematic variation useful to characterize each class. In the present study, the analysis of latent space underlying the classification model allowed us to understand the role played by the production year on geographical discrimination. The O2PLS–DA model performed considering only tomato paste samples of 2007 was capable of predicting the geographical origin of all analyzed samples. The effect of the production year therefore resulted in not affecting the geographical origin discrimination.

KEYWORDS: Concentrated tomato paste; O2PLS–DA; S-plot; ¹H NMR; geographical origin; production year