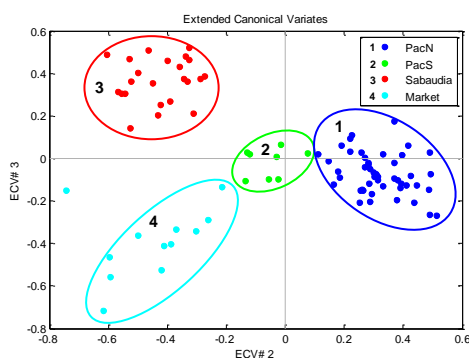


Title:**Pomodoro di Pachino: An Authentication Study Using $^1\text{H-NMR}$ and Chemometrics
Protecting Its P.G.I. European Certification****Authors & affiliations:***F. Savorani,^{‡†} F. Capozzi,[‡] S.B. Engelsen[†]*[‡]Department of Food Science, University of Bologna, Piazza Goidanich 60, 47023 Cesena (FC) Italy[†]Department of Food Science, Quality & Technology, Faculty of Life Sciences - University of Copenhagen, Rolighedsvej 30, DK-1958 Frederiksberg C Denmark**Abstract:**

Thanks to its peculiar characteristics, due to a combination of climate, salt water irrigation and cultivation techniques, the Italian cherry tomato of Pachino is the first tomato to obtain the European P.G.I. (*Protected Geographical Indication*) certification of quality.

Because of its high production costs and the consequently high price of the final product, commercial fakes with definitely lower organoleptic characteristics are present on the Italian and international markets and it is therefore necessary to protect producers as well as consumers. For this reason, great interest has recently been focused on analytical techniques able to predict the origin of a tomato sample, indicating whether or not it originates from the area of Pachino, Sicily (Italy). Chemometric methods have been successfully used to solve this type of authentication problems (e.g. apple juice or olive oil), but to the best of our knowledge, they have not been applied to tomato.

In this study about 300 different cherry tomatoes were harvested in selected farms in Pachino and in other Italian geographical regions, and then freeze-dried, extracted and analyzed using 400 MHz ^1H Nuclear Magnetic Resonance. The NMR data were treated in order to make them suitable to multivariate data analysis. Exploratory analysis of the data showed a quite clear separation of samples according to harvesting season. Subsequent chemometric classification tools such as PLS-DA, PC-LDA and ECVA were exploited in order to achieve results better than 90% of predictivity of the models. ECVA proved to be a powerful method for dealing with high resolution NMR data, avoiding the unnecessary binning step and allowing for a clear identification and interpretation of the discriminating signals.

**Fig.1:** ECVA scores plot of summer samples. Binned data