

Multielement fingerprinting of soils and agriproducts as tracer of food geographical provenience: the case of Vesuvian Piennolo Tomato PDO

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Multielement fingerprinting is one of the most widely used technique to discriminate the geographical origin of food. It takes advantage of the fact that mineral elements can be transferred from soil to agricultural products and thus any difference in element distribution between different geographic regions are reflected in agriproducts.

The Vesuvian Piennolo Tomato (VPT) is a traditional variety, grown in the Campania (Italy) on the Somma-Vesuvius volcano slopes, sold assembled in bunches and characterized by long shelf-life. VPT was awarded by Protect Designation Origin (PDO) in 2009. Local "custodian farmers" play an important role in conserving traditional cultivation management and biodiversity, as well as organoleptic properties deriving from Vesuvian environment. Due to the high typicity and higher selling value, VPT is susceptible to origin fraud. Thus, main aim of our study is to valorise VPT strengthening the traceability system. A way to achieve this is to link the tomato to the soil characteristics by multielement fingerprinting. In this work, the multielement profiles of VPT (three ecotypes) from five PDO and two not PDO farms were investigated in two production years. In addition, the multielement profile of cultivation soils (total and bioavailable elements) was investigated to evidence the variability of the PDO or not PDO soils and relationships with related tomatoes.

The exploratory PCA analysis of multielement profiles evidenced a tendency to a natural grouping of tomato and soil according to provenance farms. By contrast any tendency to a natural grouping of tomatoes according to ecotypes was observed. S-LDA model applied on tomato multielement profiles grouped by farms gave 100% of correct classification and external validation, demonstrating a great discriminating power of multielement fingerprinting. The good correlation between elements in soil and tomatoes reinforced the reliability of the discriminant variables.

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