ENVIRONMENTAL AND PROCESSING-DERIVED METABOLOMICS ALTERATIONS IN SAFFRON (C. SATIVUS L.) MATURE STIGMAS FROM TWO PDO ECOTYPES (CASTILLA-LA MANCHA; KOZANI)

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Saffron is the most expensive spice in the world, mainly due to its very limited and costly production, both in terms of product amount (3 stigmas for 3 flowers are produced from each corm) and cultivation, and of manual procedures of harvest, respectively. For all these aspects, saffron is one of the most adulterated and sophisticated product on the market, and assessment of robust protocols of metabolite determination, with the subsequent determination of genotype- or process-specific metabolic markers are needed to assist the consumers. Europe owes several high-quality ecotypes, as the Spanish “Castilla-La Mancha” and the Greek “Krocus Kozanis”, which are subjected to distinct methods of dessication, and that were utilized in the present study to develop a saffron-specific metabolomics database. At this aim, global metabolic profiling protocols were set up for both polar and non polar fractionby high resolution (Orbitrap) LC-ESI(+)-MS and LC-APCI(+)-MS. Overall, a custom database of saffron polar and non polar metabolites was constructed, by combining metabolite lists developed “in house” on different matrices, data from the literature, and identification of the main chromatographic peaks on the basis of thei accurate mass, by online database (Metlin, Chemspider) interrogation. A large set of primary and secondary metabolites, including amino acids, organic acids, sugars, lipids, apocarotenoids, phenolics, flavonoids, carotenoids, isoprenoids etc was identified, and a series of bioinformatics approaches including multivariate (PCA), hierarchical clustering (HCL) and correlation matrices and networks were exploited to identify metabolic markers specifically associated to the two PDO ecotypes under study.