

GREEK PDO SAFFRON AUTHENTICATION STUDIES USING SPECIES SPECIFIC MOLECULAR MARKERS

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Saffron, the spice produced from the red stigmas of the flower of *Crocus sativus* L. is a frequent target of fraud and mislabeling practices that cannot be fully traced using the ISO 3632 trade standard specifications and test methods. A molecular approach is proposed herein as an alternative, promising branding strategy for the authentication of highly esteemed saffron brands like the Greek Protected Designation of Origin (PDO) “Krokos Kozanis”. Specific ISSR markers were used to assess, the within species variability of several populations of *C. sativus* L. from the cultivation area of “Krokos Kozanis” and the potential differences with the band pattern produced by other *Crocus* species. Then, species-specific markers were developed suitable for HRM analysis coupled with universal DNA barcoding regions (*trnL*) (Bar-HRM) and applied to saffron admixtures with some of the most common plant adulterants (*Calendula officinalis*, *Carthamus tinctorius*, *Gardenia jasminoides*, *Zea mays* and *Curcuma longa*). The sensitivity of the procedure was tested for turmeric as a case study whereas HPLC-fluorescence determination of secondary metabolites was also employed for comparison. The overall results indicated that the Bar-HRM approach is quite effective in terms of specificity and sensitivity. Its effectiveness regarding the detection of turmeric was comparable to that of a conventional HPLC-based method (0.5 % vs 1%, w/w). Yet, the proposed DNA-based method is faster, cost-effective and can be used even by non-geneticists, in any laboratory having access to an HRM-capable real-time PCR machine. It can be thus regarded as a strong analytical tool in saffron authentication studies.