Authenticity of Portuguese olive oils assured by the use of molecular markers

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Olive (*Olea europaea* L. subsp. *europaea* var. *europaea*) is one of the oldest tree crops in the Mediterranean basin which has recently be gaining attention due to the nutritional and health properties of its fruit and derived oil. The demand for high quality olive oils have been directly implicated on the increase of typical marks, awarded to high-quality olive oils produced from local varieties grown in well-deﬁned geographical regions. To protect the typicity of those regional products -and consequently protect both consumers’ expectations and producers’ proﬁts- several Protected Denomination of Origin (PDO) regions have been established by legislation in different olive oil producer countries. Portugal has registered six PDO regions regarding virgin olive oils, produced from eleven Portuguese varieties and including blend and monovarietal products. Their authenticity should to be guarded, particularly with the increase in the use of foreigner varieties in recently established orchards under intensive management regimes. In this sense, it is mandatory to find methodologies that enable the detection of adulteration and/or fraud, namely the improper use of fruits from those varieties in PDO olive oils production. We have established a DNA-based molecular tool to be applied in olive oils traceability. The established tool is based on Single Sequence Repeats (SSRs) markers to assess genetic variation across five representative Portuguese olive varieties (‘Cordovil de Serpa’, ‘Cobrançosa’, ‘Galega vulgar’, ‘Carrasquenha’ and ‘Verdeal Alentejana’) and two non-Portuguese varieties (‘Arbequina’ and ‘Picual’ as the varieties most used in new orchards). Selection of the most polymorphic SSRs was conducted by High-Resolution Melting technique. From the 31 SSRs screened by HRM, six were selected for varieties identification through fragment length analysis. As part of olive oil authenticity checking, the applicability of the previous selected SSRs on olive oils was demonstrated. This tool has the potential of being further developed into a fraud screening system to support Portuguese olive oil certification.

**Key words:** single sequence repeats (SSRs), olive genotyping, allele size diversity, olive oil traceability, High-Resolution Melting, fragment length analysis

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