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ORIGINAL PAPER

Analysis of genetic relationship among *Arbutus unedo* L. genotypes using RAPD and SSR markers

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Abstract: The strawberry tree (*Arbutus unedo* L.) is an underutilized, drought tolerant, fire resistant species with a south western distribution in Europe, and with ecological and putative socio-economical impact in Portugal and Mediterranean countries. Our aim was to develop an appropriate set of molecular markers to enable genetic diversity to be assessed and to fingerprint *Arbutus unedo* genotypes for breeding and conservation purposes in Portugal. Twenty-seven trees from a broad geographic range were screened with 20 random amplified polymorphic DNA (RAPD primers) and 11 microsatellite markers (SSR). The RAPDs generated 124 bands, 57.3% of which were polymorphic, with an expected heterozygosity of 27%. We cross-amplified 11 SSR primers developed for *Vaccinium* spp., and 5 were found to be polymorphic in *A. unedo*, with 75% of expected heterozygosity, a number of alleles of 11.6, a null allele frequency of 7.6% and a polymorphic information content of 71%. Although the SSRs were more polymorphic and informative than the RAPDs, both markers displayed high genetic variability with the gathered data. No geographic pattern was observed in the genetic variation distribution based on both marker systems, and the lack of correlation between genetic and geographical matrices was confirmed by Mantel tests. Likely, no correlation was found between pairwise SSR and RAPD band-sharing matrices. These results and their implications on *A. unedo* breeding and conservation programs are discussed.

Keywords: Ericaceae; fingerprinting; geographic pattern; molecular markers; strawberry tree.

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Introduction

The strawberry tree (*Arbutus unedo* L.) is an evergreen shrub or small tree belonging to the Ericaceae family with a circum-Mediterranean distribution, growing in regions where temperatures are amenable (Torres et al. 2002). According to the International Centre for Underutilized Crops (www.cropsforthefuture.org) and the Global Facilitation Unit for Underutilized Species (www.underutilized-species.org) this species falls into the category of neglected or underutilized crops. Therefore, it is an undervalued fruit tree, with different possible commercial uses from processed and fresh fruit production to ornamental, pharmaceutical and chemical industrial applications, due to the phenolic acids and terpenoid compounds with strong antioxidant activity, vitamin C and tannin content (Celikel et al. 2008). In addition, it is fire resistant and, due to its pioneer status, it is valuable for land recovery and desertification avoidance (Piotto et al. 2001).

In Portugal *A. unedo* is widely distributed, from Atlantic climate areas in the North to dry arid areas in the South, occupying about 15,500 ha (Godinho-Ferreira et al. 2005) and, to our knowledge, its genetic diversity status is unknown. According to Pedro (1994) *A. unedo* rarely constitutes dominant stands being more common in patchy bush-like communities or in natural stands dominated by oaks. The species appears naturally in different phytosociological alliances, from the cork-oak woodlands (*Sanguisorbo-Quercetum suberis*) and the strawberry-tree dominated scrub (*Arbuto-Cistetum populifolii*) in the South, to the pedunculate oak-woodlands (*Rusceto-Quercetum roboris*) in the North, including the oak-woodlands (*Arisaro-Quercetum bro-*