**Introduction**

The strawberry tree (Arbutus unedo L.) is an evergreen shrub or small tree usually smaller than 5 m, belonging to the Ericaceae family, and typical of the Mediterranean basin and climate, although it can be also found in other regions such as the Near East and Transcaucasia. The fruits are spherical bodies 1.5-2 cm in diameter and fully open in autumn and winter. The berries can be eaten as fresh fruits, but they are usually prepared as preserve, jams and marmalades. The name ‘unedo’ is explained by Pityr the Elder as being derived from unum edo ‘I eat one’, which maybe due to the alcoholic content of overripe fruits.

In some countries the fruits are used to produce alcoholic beverages such as wines, liquors, and brandies (e.g. Portuguese medronho, and Kalam in Greece). Strawberry tree fruits are also well known in folk medicine as antispasmodic, diuretics, and laxatives, while the leaves of the plant are used as diuretic, urinary antiseptic, antianemic, astrigent, depurative, and antihypertensive.

The chemical composition of A. unedo fruits has been studied by several authors (1-3), but almost any exhaustive determination of carotenoids has been carried out up to date. Recent studies have focused on the description of phenolic compounds, such as flavonoids, phenolic acids and anthocyanins, as a part of the antioxidant compositions of these fruits (4-6). However, very little attention has been paid to the carotenoid composition of these fruits, a part of the early study carried out by Schön in 1935 (7). Some of the studies analyzing the chemical and antioxidant composition of A. unedo fruits, concluded that β-carotene is the major and single carotenoid found in these fruits (2). Therefore, the aim of the present study was to carry out the isolation, identification and quantification of the main carotenoids responsible for the yellow-orange colour of the flesh of the strawberry tree fruits.

**Materials and Methods**

**Raw material**

Arbutus unedo fruits were collected during the autumn and winter (October 2006-February 2009). A tree was located at the Instituto de la Ciencia en Sevilla, and from trees at the Sierra Norte de Sevilla Natural Park (Sevilla). Samples were stored at -30ºC until analysis.

**Carotenoid extraction**

Two grams of fruit were extracted with acetone, until complete exhaustion of color, according to the procedure of Mirguio-Mossers and Hornero-Méndez (8). All extracts were pooled and transferred to diethyl ether. The ether phase, containing the carotenes and xanthophylls (free and esterified), were transformed to the corresponding furanoid xanthophylls (this transformation was carried out using the saponified extracts). The at present we are still conducting the study aimed to identify the nature of the fatty acids involved in xanthophyll esterification by using HPLC-DAD-Ms. Table 1 summarizes the identification of the main carotenoid pigments, including the quantitative composition. The total carotenoid content was about 43 μg/g of fresh weight. Seventeen carotenoids (including the cis-isomers) were identified, being β-carotene the only carotene (up to 21%), which was the highest content in a whole family of mono- and dihydroxylated xanthophylls and their 5,6-epoxide derivatives. Due to the acidity of the fruit, and the softness flesh, a high proportion of the 5,6-epoxide carotenoids were transformed to the corresponding furanoid xanthophylls (this was not avoided when using sodium carbonate during the extraction, indicating their presence in the fruits before the extraction). In fact, although violaxanthin was one of the major pigments (19.7%), luteoxanthin (α-derivative of violaxanthin containing 5,6-epoxide group) was at higher concentrations (22.4%). Other outstanding pigments were neoxanthin (11.0%), neoxanthin (9.1%), antheraxanthin (4.2%), lutein 5,6-epoxide (7.4%), zeaxanthin (6.4%) and lutein (12.2%). For the first time, the carotenoid composition of strawberry tree fruits has been studied in detail (10).

**Results and Discussion**

The carotenoids corresponding to the direct and saponified extracts obtained from ripe fruits of strawberry tree are shown in Figure 2, indicating that more than 90% of the xanthophylls were isolated and purified from natural sources. Due to the fact that the xanthophyll esters were not well resolved, the identification was carried out using the saponified extracts. At the present we are still conducting the study aimed to identify the nature of the fatty acids involved in xanthophyll esterification by using HPLC-DAD-Ms. Table 1 summarizes the identification of the main carotenoid pigments, including the quantitative composition. The total carotenoid content was about 43 μg/g of fresh weight. Seventeen carotenoids (including the cis-isomers) were identified, being β-carotene the only carotene (up to 21%), which was the highest content in a whole family of mono- and dihydroxylated xanthophylls and their 5,6-epoxide derivatives. Due to the acidity of the fruit, and the softness flesh, a high proportion of the 5,6-epoxide carotenoids were transformed to the corresponding furanoid xanthophylls (this was not avoided when using sodium carbonate during the extraction, indicating their presence in the fruits before the extraction). In fact, although violaxanthin was one of the major pigments (19.7%), luteoxanthin (α-derivative of violaxanthin containing 5,6-epoxide group) was at higher concentrations (22.4%). Other outstanding pigments were neoxanthin (11.0%), neoxanthin (9.1%), antheraxanthin (4.2%), lutein 5,6-epoxide (7.4%), zeaxanthin (6.4%) and lutein (12.2%). For the first time, the carotenoid composition of strawberry tree fruits has been studied in detail (10).

**Literature cited**

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