SHORT COMMUNICATION

Fatty Acid Composition of Seed Oil Triglycerides in *Coincya* (Brassicaceae)

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Oil and triglyceride contents and fatty acid composition were determined for seeds in nine taxa belonging to the genus *Coincya* (Brassicaceae) on the Iberian Peninsula (Spain and Portugal). The oil content ranges from 11.1 to 24.6%, triglycerides from 68.7 to 88.5%. The major fatty acids were erucic (24.6–30.5%), linolenic (17.7–27.7%), linoleic (13.9–24.6%) and oleic acid (12.3–21.8%).

KEY WORDS: Brassicaceae, *Coincya*, fatty acids, oil content.

Coincya constitutes a rare wild genus, belonging to the Brassicaceae, with distribution restricted to the Mediterranean region and central Europe. It has been studied mostly on the Iberian Peninsula (Spain and Portugal), where it is best represented by four of the six species and eleven of the fourteen infraspecific taxa that are recognized in the genus (1). *Coincya* is included in the tribe of the *Brassiceae* with other genera of well-known economic and nutritive value, such as *Brassica, Sinapis* or *Raphanus*. In spite of the relationship with these commercial plants, there is no previous report of fat compositions in *Coincya*, although screening of fatty acid composition of numerous wild plants has been reported for this family and others (2,3). In this study we investigated *Coincya* oil for commercial potential.

MATERIALS AND METHODS

Seed samples were collected from the wild at full maturity, in Spain and Portugal during late spring and summer of 1990 and 1991. Voucher specimens of the samples analyzed are deposited in the Herbarium of the Vegetable Biology Department of the University of Seville (Seville, Spain).

Seeds, after washing, were ground in a mechanical crushing mill. The oil was exhaustively extracted from the resulting flour with *n*-hexane in a Soxhlet-type apparatus for three hours, following IUPAC recommendations (4). The extract was concentrated under an N_2 stream for quantitative determination of the oil content. Purification of the triglycerides was carried out by thin-layer chromatography (TLC) on silica gel 60-G plates. The developing solvent was hexane/diethyl ether/acetic acid (70:30:1). The triglycerides were visualized with iodine vapor. After separation, the triglycerides were washed from the TLC plate, dried and weighed. The transesterification of the triglycerides was carried out with tetramethyl ammonium hydroxide (25%) according to Metcalfe and Wang (5). Preliminary analysis of the methyl esters by TLC did not reveal fatty acids with unusual functionality, such as epoxy groups.

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The gas-chromatographic analysis of the methyl esters was carried out with a Hewlett-Packard GC, model 5890 series II, fitted with a flame-ionization detector and an HP 3390A integrator (Palo Alto, CA). A capillary column, Supelco (Bellefonte, PA) Omegawax TH 320 (L = 30 m, i.d. = 0.32 mm) was used. The injector and detector temperatures were maintained at 275°C. The column temperature was held at 175°C for 10 min, increased to 260°C (3°C/min) and maintained for 30 min. Peaks were identified with the appropriate standards and by comparing the chromatograms with others of plants with a well-known fatty acid composition, as *Brassica oleracea* or *B. napus*. The taxa are arranged in phylogenetic order in Table 1.

RESULTS AND DISCUSSION

The characteristics of the seed oils are given in Table 1. The oil content in the plants studied averaged around 20%, from 11.1% in var. *recurvata* to 24.6% in var. *johnstonii*. These percentages are smaller than the oil content of related commercial plants such as rape, but are similar to other wild Brassicaceae analyzed previously (2,3). Triglycerides represent about 75% of the fatty extract, varying between 68.7% in subsp. *hispida* and 88.5% in subsp. *nevadensis*. The rest corresponds to polar lipids, waxes, diglycerides and monoglycerides.

The fatty acid composition has a rather high proportion of unsaturated fatty acids. In general, the major fatty acids are erucic acid, 24.6–30.5%, and linolenic acid, 17.7–27.7%, with lesser amounts of linoleic acid, 13.9–24.6%, and oleic acid, 12.3–21.8%. So, the degree of unsaturation is high, the four principal acids being unsaturated. The most abundant saturated acids are palmitic acid, which does not exceed 5%, and stearic acid, not ever reaching 2%.

Apart from the presence of the C_{18} unsaturated acids, common in the vegetable kingdom, the high erucic acid content is in agreement with fatty acid composition of other wild Brassicaceae (2,3). Erucic acid constitutes a serious obstacle to the exploitation of this group of plants from a nutritional point of view, because it is undesirable in human food. On the other hand, the genus *Coincya* contains oils that appear to be suitable industrial sources for linolenic acid and erucic acid.

Coincya constitutes a group of plants that can be found in diverse habitats. It is distributed in semiarid regions *C. transtagana*, in sand dunes (var. *johnstonii*) or high mountains (subsp. *nevadensis*) above 2500 m. It is accepted that, in general, a decrease in ambient temperature produces an increase in the degree of unsaturation of fatty acids (6). However, we have not observed any correlation between the habitat temperature and fatty acid composition in *Coincya*. Moreover, subsp. *nevadensis*, which supports the lowest temperatures of the genus because

TABLE 1

Fatty Acid Composition of the Triglyceride (TG) Seed Oils in *Coincya*[a]

Taxa	Oil	TG	16:0	16:1	18:0	18:1	18:2	18:3	20:0	20:1	20:2	21:1	22:0	22:1	22:2	n[b]
C. transtagana	15.8±3.8	85.4±4.1	5.0±1.1	0.4±0.2	1.4±0.1	12.3±2.0	17.5±2.3	25.4±2.6	0.9±0.1	5.2±0.6	1.0±0.3	0.6±0.1	0.8±0.2	28.6±7.0	0.8±0.2	3
C. longirostra	21.4±1.5	71.6±7.5	3.8±0.5	0.3±0.1	1.4±0.1	14.2±0.8	14.8±1.6	27.7±2.4	1.1±0.2	6.0±0.2	1.2±0.1	0.6±0.2	0.9±0.4	27.6±2.8	0.9±0.5	4
C. rupestris																
subsp. *rupestris*	21.9±0.2	75.0±0.0	4.2±0.5	0.4±0.1	1.6±0.1	14.4±0.3	14.3±1.2	25.7±0.7	1.1±0.1	6.1±0.1	0.5±0.1	0.5±0.1	0.7±0.0	30.5±0.1	0.4±0.1	2
subsp. *leptocarpa*	13.0±0.2	n.d.[c]	3.0±0.1	0.7±0.4	1.5±0.3	13.5±2.9	16.3±5.3	24.6±3.2	0.9±0.1	5.9±0.8	1.2±0.6	0.8±0.3	0.9±0.4	29.8±3.8	0.9±0.4	3
C. monensis																
subsp. *recurvata*																
var. *recurvata*	11.1±4.4	71.6±9.9	4.3±0.8	0.4±0.2	1.8±0.2	16.0±2.2	15.6±1.5	23.5±2.1	1.2±0.1	6.2±1.1	0.9±0.1	0.4±0.1	0.8±0.2	28.6±3.5	0.5±0.1	15
var. *johnstonii*	24.6±0.0	80.0±0.0	3.9±0.0	0.8±0.0	1.7±0.0	15.2±0.0	24.6±0.0	17.7±0.0	0.9±0.0	8.1±0.0	0.6±0.0	0.3±0.0	0.5±0.0	25.4±0.0	0.3±0.0	1
var. *granatensis*	n.d.	n.d.	4.2±0.0	0.5±0.0	1.9±0.0	14.5±0.0	17.2±0.0	24.4±0.0	1.2±0.0	7.3±0.0	1.2±0.0	0.6±0.0	1.7±0.0	24.6±0.0	0.7±0.0	1
subsp. *hispida*	16.0±5.1	68.7±8.9	4.1±0.2	0.4±0.1	1.8±0.3	17.2±2.3	15.6±1.8	24.0±3.6	1.2±0.2	6.4±1.2	0.9±0.2	0.4±0.1	0.7±0.2	27.0±3.1	0.4±0.1	15
subsp. *nevadensis*	21.9±4.7	88.5±3.3	3.5±0.7	0.5±0.3	1.9±0.3	21.8±3.7	13.9±0.8	21.1±3.7	1.1±0.2	8.7±0.4	0.8±0.2	0.4±0.1	0.5±0.2	25.5±1.8	0.5±0.4	4

[a]Results are expressed as average percentages ± SD. The percentages represent the sum of all the isomers with the same number of carbon atoms and unsaturations.
[b]Number of populations studied.
[c]Not determined.

of its alpine habitat, has the least linolenic acid and the most oleic acid, opposite of what would be expected. These data may indicate a well-fixed composition of fatty acids in *Coincya* independent of the environment.

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