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Sensory characterization of virgin olive oil–based cosmetic creams

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Synopsis

The influence of olive oil concentration and sensory profile on the odor of virgin olive oil-based cosmetic creams was studied. Four olive oils were selected on the basis of different intensities of positive and defective odor attributes: two extra virgin olive oils, one virgin olive oil, and one ordinary virgin olive oil. Thirty cosmetic creams were prepared, by both cold and hot processing methods, using each of the above oils at concentrations of 3%, 5%, and 10%, in addition to mineral oil controls. A trained sensory panel evaluated the fruitiness and defectiveness intensities in the odor of creams, using unstructured 10-cm scales ranging from "none at all" to "much." The fruity and defective attributes perceived in the odor of creams were significantly influenced by the sensory profile of the starting olive oil, oil concentration, and preparation method. Overall, these findings suggest that virgin olive oils of only slightly fruity odor may be conveniently used for the preparation of cold-processed cosmetic creams, whereas ordinary virgin olive oils appear to be suitable for the preparation of cosmetic creams only by hot processing of the emulsion at a low oil concentration.

INTRODUCTION

Natural oils were used by ancient civilizations for cosmetic purposes, as well as to mask unpleasant body odors. Attributed to Galeno (~100–200 BC), the first recorded cosmetic emulsion (Ceratum refrigerans, the ancestor of today's cold cream), was made with olive and almond oils, beeswax, and rosewater (1).

Lipids act as emollients (fr. L*molle*: soft, smooth). Having the capacity of replacing natural skin lipids, emollients contribute to the retention of water at the stratum corneum and assist in the cellular renewal process, providing a soft, elastic, lubricated condition associated with skin well-being. The activity of emollients has been ascribed to their ability to remain on the skin surface over prolonged time periods (2–5).

Naturally occurring substances, including natural feedstock and secondary products derived from the processing of foodstuffs, are highly valued in the cosmetic industry on

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account of their associated skin and hair replenishing properties (6). Virgin olive oil is suitable for topical therapeutic and cosmetic use due to its high oleic acid and squalene contents and the presence of antioxidant species, making it especially suitable for skin care applications (7).

Monographs on virgin and refined olive oil are found in several pharmacopoeias (8–10). Reported external uses of olive oil-based ointments or topical preparations include the treatment of a number of skin conditions, such as dermatitis, ichthyosis, burns, eczema, and psoriasis (11–14). Likewise, olive oil has been attributed to anti-inflammatory and antiaging properties (15) and has been suggested as a suitable drug solvent (16) and emollient (12).

The quality of olive oil can be defined from a commercial, nutritional or sensory standpoint (17). The nutritional value of olive oil is associated with its high oleic acid content and the presence of minor components, such as phenolic compounds, while its flavor is strongly influenced by the presence of volatiles (18–19). The sensory profile of an olive oil will vary according to olive variety, soil characteristics, climate, tree health, fruit maturity at the time of harvest, collection process, storage conditions, oil extraction process, conservation method before packaging, packaging means, and preservation method and/or additives (20–21).

The sensory quality of virgin olive oils may be quantified by evaluating the sensations defined by smell, aroma, taste, and pungent and astringent mouth sensations. Healthy olives introduce positive attributes (fruity, bitter, and pungent), whereas the processes occurring after harvesting tend to mitigate these attributes and induce the appearance of defects, i.e., attributes that are detrimental to product quality (22).

The fruity attributes perceived as a smell (directly) or flavor (retronasal) when oil is introduced in the mouth. The maximum odor intensity of olive oil corresponds to the maximum volatile content of the extracted olives, tending to coincide with the optimum maturation degree of harvested olives. The fruitiness of olive oil can be perceived as greenly fruity and/or ripely fruity. The International Olive Oil Council (COI) defines the fruity attribute of olive oil as the "set of olfactory sensations characteristic of the oil, which depends on the variety and comes from sound, fresh olives, either ripe or unripe perceived by direct or retronasal means" (23).

According to standard COI/T.15/NC No. 3/Rev. 4 (2009), commercial grading of olive oil is based on physicochemical and sensory analysis. According to the results of sensory analysis, olive oils are classified as extra virgin (median of defectiveness rating amounting to zero and median of fruitiness rating greater than zero), virgin (median of defectiveness rating greater than zero but not greater than 3.5 and median of fruitiness rating greater than zero), ordinary virgin (median of defectiveness rating greater than 3.5 but not greater than 6.0, or median of defectiveness rating not greater than 3.5 and median of fruitiness rating amounting to zero), and lampante virgin (median of defectiveness rating greater than 6.0). Olive oils classified as lampante virgin cannot be sold and must be refined, losing their virgin quality.

Several studies have reported on the effectiveness of olive oil as a cosmetic ingredient. However, the influence of the sensory profile of virgin olive oil on the scent of the resulting cream has not been addressed. A cream containing olive oil can have a characteristic smell that impacts consumer acceptability negatively or requires the use of flavoring essence.

This study was aimed at assessing the influence of the concentration and the sensory profile of different virgin olive oils on the odor of cosmetic creams produced by two different methods.

MATERIALS AND METHODS

OLIVE OIL SENSORY PROFILES

Four locally available virgin olive oils of different quality were used for cream preparation: extra virgin, Coratina variety, harvest 2011 (A); extra virgin, Picual variety, harvest 2011 (B); virgin, Arbequina and Picual bivarietal, harvest 2010 (C); and ordinary virgin (D).

The commercial quality of the above oils was confirmed and a descriptive profile obtained from the analysis of a nine-assessor panel recruited and trained as per COI standards (24). The oils were evaluated in duplicate over two consecutive work sessions. To minimize the possibility of systematic error, samples were presented on a random basis.

Fifteen milliliter of oil was poured into blue-colored tasting glasses (25) to exclude the visual factor. Oil samples codified with three-digit random numbers were presented at 28 ± 2°C and rated on 10-cm unstructured scales according to each of the following positive and negative attributes: fruity (greenly/ripely), bitter, pungent, green (leaves/herbs), fig tree, tomato (plant, leaves, fruit), apple, banana, almond/nuts, sweet, and astringent, among other positive attributes; and fusty/muddy sediment, musty/humid/earthy, winey/vinegary/acid/sour, frostbitten olives (wet wood), and rancid, among other negative attributes. Evaluations were conducted in a tasting room equipped as per COI/T.20/Doc. No. 6/Rev. 1, with five individual cabins furnished with temperature control (22–24°C) and air circulation means.

CREAM PREPARATION PROCEDURE

To establish the possible effect of heating on the odor of creams, both hot and cold preparation methods were used. Two bases were used for cream preparation: base C (cold method) and base H (hot method). Four virgin olive oils (A, B, C, and D) at concentrations of 3%, 5%, and 10% were used in the preparation of each such base to provide adequate emollient action (26,27). Control creams were prepared with mineral oil (E). A total of 30 creams were prepared (Table I).

Base C: O/W emulsion prepared by the cold method; a preneutralized, lightly cross-linked, highly branched polymer, also acting as a consistency agent, was used as emulsifier. Ingredients according to International Nomenclature of Cosmetic Ingredients (INCI): aqua, acrylates/acrylamine copolymer (and) mineral oil (and) polysorbate 85, propylene glycol (and), methyl paraben (and) propyl paraben, butylated hydroxytoluene. Emulsifier, oil, propylene glycol (and), methyl paraben (and) propyl paraben and butylated hydroxytoluene dissolved in water were mixed at room temperature on a mechanical shaker (Servodyne Mixer Heat 50003-45, Cole Parmer Instrument Co. Vernon Hills, IL) at 500 rpm for 5 min.

Base H: O/W emulsion with nonionic emulsifier. INCI ingredients: aqua, ceteareth-20, cetostearyl alcohol, glyceryl monostearate, propylene glycol (and) methyl paraben (and)

Table I
Cream Composition and Coding Scheme

Oil type	Oil content (%)	Cream code: Cold method	Cream code: Hot method
	3	AC3	AH3
A	5	AC5	AH5
	10	AC10	AH10
	3	BC3	BH3
B	5	BC5	BH5
	10	BC10	BH10
	3	CC3	CH3
C	5	CC5	CH5
	10	CC10	CH10
	3	DC3	DH3
D	5	DC5	DH5
	10	DC10	DH10
	3	EC3	EH3
E	5	EC5	EH5
	10	EC10	EH10

propyl paraben, butylated hydroxytoluene. One half of the total water amount, ceteareth-20, cetostearyl alcohol, glyceryl monostearate, propylene glycol, methyl paraben, propyl paraben, and butylated hydroxytoluene were water bath heated at 75–80°C for 10 min. Five-minute mechanical agitation (Servodyne Mixer Heat 50003-45) at 500 rpm was applied to disperse phases. The remaining amount of water was then slowly added at room temperature (25°C), using mechanical agitation.

For both base C and base H, 300 g cream were prepared from each of the studied oils at the three concentrations studied. Table I shows the coding scheme used to identify each of the studied cream compositions.

SENSORY EVALUATION OF CREAMS

The sensory panel previously used to evaluate the starting olive oils evaluated those 10 creams containing 10% of oil (Table I). Initially, the odor evaluation method was standardized. The assessors were then asked to describe and report major differences in the odor of samples, enabling the selection of appropriate descriptors: fruity and defective.

The 30 creams were evaluated over six separate sessions, i.e., five creams per session, presented in random manner in opaque plastic containers with lids, containing 20 g cream coded with three-digit random numbers. The cream samples were warmed in the assessors' hands, uncovered, and deep-olfacted, followed by shorter olfactions. Cream odor was rated according to fruitiness and defectiveness on 10-cm unstructured scales ranging from *none at all* to *too much*. The assessors were also asked to describe the defective odor whenever detected.

Evaluations were conducted in a testing room compliant with COI/T.20/Doc. No. 6/Rev. 1, equipped with five individual cabins with temperature control (between 22 and 24°C) and air circulation means.

STATISTICAL ANALYSIS

Data from the sensory profiles of the studied olive oils was subjected to an analysis of variance (ANOVA) considering the different oil types, the assessors, and the interaction between the two, as fixed sources of variation. Where differences were significant, honestly significant differences were calculated according to the Tukey test ($p < 0.05$).

An ANOVA was also performed on the data available from the sensory assessment of creams, considering oil quality, oil concentration, processing method, and interactions among the three, as fixed sources of variation. Mean ratings and honestly significant differences were calculated according to the Tukey test ($p \leq 0.05$).

XL-Stat 2011 software (Addinsoft, NY) was used to conduct the above analyses.

RESULTS AND DISCUSSION

SENSORY PROFILES OF VIRGIN OLIVE OILS

The sensory profiles of the studied olive oils are presented in Fig. 1 and Table II. Although the COI uses medians of the positive attributes and defects for qualifying oils, Table II shows average rating for each attribute and the results of the ANOVA. Significant differences ($p < 0.05$) were found among the four olive oil types with regard to the following attributes: fusty/muddy sediment, musty/humid/earthy, rancid, rough, fruity, bitter, pungent, green (grass/leaf), fig tree, tomato, banana, and other fruity and astringent attributes.

Overall, the odor of oil A (extra virgin) was described as undefective, balanced, greenly fruity, bitter, spicy, grass-or leaf-greenly, astringent, and more intense than that of the other oils. The odor of oil A also presented notes of tomato, apple, and almond/nut.

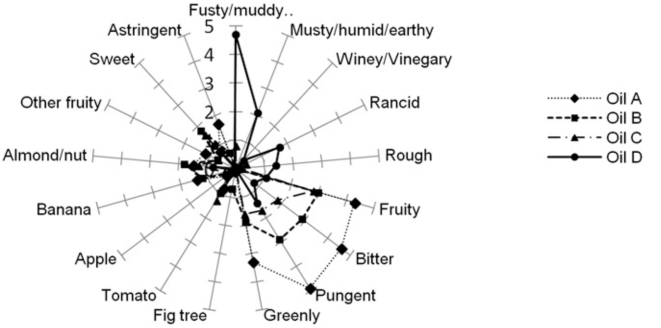

Figure 1. Olive oil sensory profiles.

Table II
Olive Oil Sensory Profiles

Attribute	Oil type A	B	C	D
Fusty/muddy sediment	0.0[c]	0.0[c]	0.8[b]	4.7[a]
Musty/humid/earthy	0.0[b]	0.0[b]	0.0[b]	2.1[c]
Winey/vinegary	0.0[a]	0.0[a]	0.2[a]	0.4[a]
Metallic	0.0[a]	0.0[a]	0.0[a]	0.0[a]
Rancid	0.0[b]	0.0[b]	0.4[b]	1.7[a]
Rough	0.0[b]	0.0[b]	0.2[b]	1.4[a]
Fruity	4.3[a]	3.0[b]	2.8[b]	1.1[c]
Bitter	4.6[a]	2.9[b]	1.8[c]	0.8[d]
Pungent	4.9[a]	2.9[b]	1.7[c]	1.4[c]
Green (grass/leaf)	3.3[a]	1.9[b]	1.6[c]	0.0[c]
Fig tree	0.1[b]	0.7[a]	0.0[b]	0.0[b]
Tomato	0.8[a]	1.0[a]	1.3[a]	0.0[b]
Apple	0.4[a]	0.2[a]	0.2[a]	0.0[a]
Banana	1.4[a]	1.2[a,b]	0.4[b,c]	0.1[c]
Almond/nut	1.5[a]	1.8[a]	1.3[a]	0.8[a]
Other fruity attributes	1.2[a]	0.7[a,b]	0.7[a,b]	0.0[b]
Sweet	0.8[a]	1.8[a]	1.6[a]	1.1[a]
Astringent	1.7[a]	0.6[b]	0.1[b]	0.1[b]

Values in a row with different superscripts are significantly different according to the Tukey test ($p \leq 0.05$).

The odor of oil B (extra virgin) was also described as undefective and balanced, though less greenly fruity, bitter, pungent, grass-or leaf-greenly, and astringent than that of oil A. It also presented fig and almond/nut notes.

Oil C (virgin) showed fruit, tomato, and banana notes and sweetness of similar intensity to that of oil B, whereas it was also described as less pungent and bitter. The fruitiness of this oil was primarily associated with notes of maturity. It showed the odor of a fusty/muddy sediment at a low intensity, confirming the virgin quality of this oil.

Oil D (ordinary virgin) showed the fusty/muddy sediment odor at a high intensity, accompanied by other defective attributes, such as musty/humid, rancid, and rough. It also showed fruity, bitter, and pungent attributes at a low intensity.

SENSORY EVALUATION OF CREAMS

An ANOVA showed that the intensity of fruity and defective odors varied significantly ($p < 0.0001$) among the tested creams, indicating that some of the factors studied influenced the odor perceived by the sensory panel. Table III shows the average intensity of fruity and defective odors among the 30 creams.

Fruitiness. Both oil type and concentration, as well as the interaction between the two, significantly affected ($p < 0.0001$) the fruitiness attribute of the odor of creams. Overall,

Table III
Average Intensity of Sensory Attributes According to Cream

Cream	Fruity odor	Defective odor
AC3	$1.1^{b,c}$	0.0^{d}
AC5	2.0^{a-c}	0.0^{d}
AC10	3.6^{a}	0.0^{d}
BC3	$0.7^{b,c}$	0.0^{d}
BC5	$0.6^{b,c}$	0.0^{d}
BC10	1.7^{a-c}	0.0^{d}
CC3	$0.5^{b,c}$	0.0^{d}
CC5	$0.8^{b,c}$	0.0^{d}
CC10	$2.2^{a,b}$	0.0^{d}
DC3	$0.3^{b,c}$	1.8^{c}
DC5	$0.9^{b,c}$	4.4^{b}
DC10	0.2^{c}	6.7^{a}
EC3	0.0^{c}	0.0^{d}
EC5	0.0^{c}	0.0^{d}
EC10	0.0^{c}	0.0^{d}
AH3	$0.8^{b,c}$	0.0^{d}
AH5	$1.5^{b,c}$	0.0^{d}
AH10	$1.3^{b,c}$	0.0^{d}
BH3	$0.9^{b,c}$	0.0^{d}
BH5	$0.7^{b,c}$	0.0^{d}
BH10	$1.4^{b,c}$	0.0^{d}
CH3	$0.3^{b,c}$	0.0^{d}
CH5	$0.5^{b,c}$	0.0^{d}
CH10	$1.7^{a,b,c}$	0.0^{d}
DH3	$0.9^{b,c}$	0.2^{d}
DH5	$0.7^{b,c}$	2.2^{c}
DH10	$0.8^{b,c}$	$5.0^{a,b}$
EH3	0.0^{c}	0.0^{d}
EH5	0.0^{c}	0.0^{d}
EH10	0.0^{c}	0.0^{d}

Values in a column with different superscripts are significantly different according to the Tukey test ($p \leq 0.05$).

increasing oil concentration resulted in increasing fruitiness, the selected range of oil concentration leading to creams with odors of significantly different fruitiness. The odor of creams containing 10% of oil was rated as significantly fruitier than that of those creams containing 3% and 5% of oil; whereas no difference was found between creams containing oil at the latter two concentrations.

The fruitiness perceived in the odor of creams prepared from oil A (more intensely greenly, fruity, and grass/leaf-greenly than for the other oils) was significantly ($p <$ 0.0001) more intense than in that perceived in the odor of the other creams. According to these results, an intense fruity odor of the starting olive oil (above four on the

COI scale) will be perceived in the resulting cream. However, no difference was found between those creams containing a less fruity olive oil (below three on the COI scale) and the corresponding control cream prepared with mineral oil. This suggests that cosmetic creams containing a slightly fruity olive oil will not have a noticeable fruity odor.

The preparation method did not significantly ($p > 0.05$) affect the perception of fruitiness in the odor of creams. Fruitiness was significantly ($p = 0.0167$) affected by the oil type vs processing method interaction, showing that these variables cannot be considered independently.

It was observed that cold-processed creams and those prepared with oil A—irrespective of concentration—had odors of higher fruitiness intensity. The above presumably reflects the loss of volatile compounds responsible for a highly intense fruity odor of virgin olive oils during the hot processing of creams. Creams prepared from oils having a less intense fruity odor were not affected by the preparation method. Fig. 2 shows the fruitiness intensity perceived in the odor of each oil type according to preparation method.

Defective odor. Oil type, oil concentration, and emulsion technique significantly ($p < 0.0001$) affected the degree of defectiveness in the odor of creams. In addition, the resulting odor was significantly affected by the oil type vs concentration interaction ($p < 0.0001$) and the oil type vs processing method interaction ($p = 0.0167$), showing that none of the three variables can be considered independently.

Only the odor of creams prepared with oil D (ordinary virgin) was found defective, described as the odor of fusty/muddy sediment. This shows that a strong defective odor in a virgin olive oil will be perceived in the cream. The intensity of defectiveness in the odor of cold-processed creams containing 10% of this oil largely exceeded the defectiveness intensity value perceived in the oil (6.5 compared with 4.7). This may be attributed to a lesser tendency of volatile compounds contained in the pure oil to be released, presumably on account of the formation of high molecular weight complexes with other components, structures that may have been altered during cold emulsion processing.

No defectiveness was found in the odor of creams prepared from oil C (low odor defectiveness, below one on the COI scale) irrespective of oil concentration and processing method. An olive oil with odor of low defectiveness intensity (virgin oil) may be successfully used

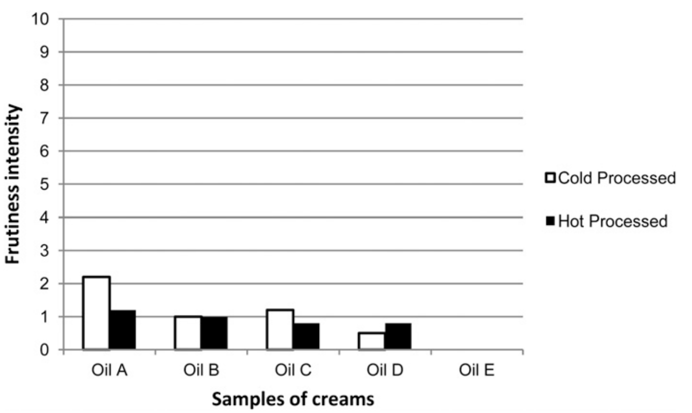

Figure 2. Fruitiness intensity in the odor of creams according to preparation method.

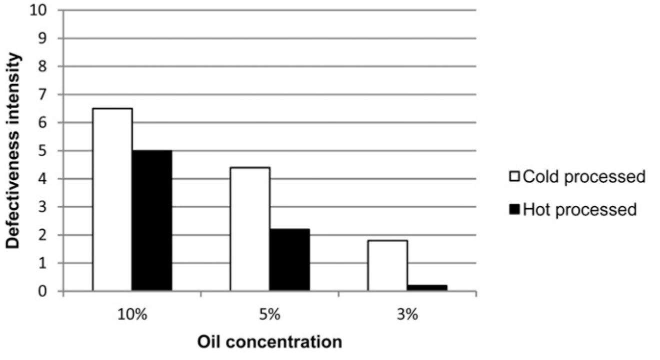

Figure 3. Defectiveness intensity in the odor of creams prepared from oil D.

without an apparent effect on the odor of the resulting cosmetic cream. Fig. 3 shows the influence of the concentration of oil D and the emulsion processing method on the defectiveness perceived in the odor of the resulting creams. The defectiveness intensity in the odor of creams prepared from the oil D was found to increase significantly with increasing oil concentration. All cold-processed creams had odor of higher defectiveness intensity than the odor of the corresponding hot-processed creams. This reflects a significant influence of the temperature used in the emulsion preparation process, and the possible loss, during hot processing, of volatile components responsible for the defective attributes perceived in the odor of the starting oil.

In particular, no significant difference was found between the defectiveness intensity perceived in the odor of creams containing 3% of oil D and in the odor of hot-processed creams prepared with any of the other oils. Therefore, a defective olive oil (ordinary virgin) may be satisfactorily used at a low concentration to prepare a cosmetic cream by the hot emulsion preparation method.

CONCLUSIONS

The fruitiness and defectiveness intensities perceived in the odor of cosmetic creams were found to depend on the emulsion preparation method and the final oil concentration in the cream.

Overall, these results show that the hot emulsion processing method enabled a partial reduction of unpleasant odor attributes, compared with cold-processed creams. Nevertheless, oils with a slightly fruity odor (intensity below three on the COI scale) may be conveniently selected for the preparation of cold-processed cosmetic creams.

Oil concentration was found to affect the odor of the resulting cream only when the starting oil had intense odor. Ordinary virgin oil may be satisfactorily used for the preparation of only hot-processed creams at a low oil concentration.

REFERENCES

(1) H. Fishman, "Cosmetic, Past, Present, Future," in *The Chemistry and Manufacture of Cosmetics, Basic Science*, M. Scholossman. Ed. (Allured Publishing Corporation, Carol Strem, Illinois, 2000), Vol. 1, pp. 1–10.

(2) A. Monclus, "Natural Oils and Fats," in *Cosmetic Raw Material Analysis and Quality, Hydrocarbons, Glycerides, Waxes and Other Esters*, International Federation of Societies of Cosmetic Chemists. (Micelle Press, Weymouth, United Kingdom, 1994), Vol. 1, pp. 1–12.
(3) M. Rieger, Selected natural oils and fats used in cosmetics, *Cosméticos Nuevos.,* **2,** 11–20 (1996).
(4) B. Salka, Choosing emollients: Four factors will help you decide, *Cosmet. Toiletries,* **112,** 101–106 (1997).
(5) G. Zocchi, "Skin Feel Agents," in *Handbook of Cosmtic Science and Technology*, *3rd Ed.* A. Barel, M. Paye, and H. Maicach. Eds. (Informa Health Care, New York, 2009), Chapter 34, pp. 357–370.
(6) R. Schueller and P. Romanowski, "Oil of Nature," in *Beginning Cosmetic Chemistry, Allure books, 3rd Ed.* (Carol Stream, Illinois, 2009), pp. 117–128.
(7) P. Viola and M. Viola, Virgin olive oil as fundamental nutritional component and skin protector, *Clin. Dermatol.,* **27,** 159–165 (2009).
(8) European Pharmacopoeia, *4th Ed.*, Eds. (Directorate for the Quality of Medicines of the Council of Europe, EDQM, 2011), pp. 1664–1665.
(9) British Pharmacopoeia, Vol 4., Eds. (British Pharmacopoeia Commission Office, 2004), A84.
(10) United States Pharmacopeia 28, National Formulary 23, Eds. (United States Pharmacopeial Convention, INC, 2005), pp. 3043–3044.
(11) T. López Luengo, The olive tree, Therapeutic Properties, *Offarm,* **25**(11), 56–59 (2006).
(12) Martindale: The complete drug reference, K. Parfitt.Ed. *32nd Ed*. (Pharmaceutical Press, Tauton, 1999), p. 1610.
(13) A. Ruiz, J. Arias, and V. Gallardo, "Skin Creams Made with Olive Oil," in *Olives and Olives Health and Disease Prevention*. V. Preedy and R. Watson. Eds. (Academic Press, Elsevier, Tucson, 2010), pp. 1133–1141.
(14) B. Vanaclocha and S. Cañigueral, Phytotherapy, vademecum prescriptions, *4th Ed*. Masson S.A., Barcelona, 2003), pp. 384–387.
(15) B. Arief, et al., Protective effect of topically applied olive oil against photocarcinogenesis following UVB exposure of mice, *Carcinogenesis,* **21,** 2085–2090 (2000).
(16) J. Bruneton, *Pharmacognosy, Phytochemistry Medical Plants*, *2nd. Ed*. (Intercept Ltd., Londres, 1999), pp. 143–144.
(17) R. M. Duran, Relationship between the composition and ripening of the olive and the quality of the oil, *Acta Hort.,* **286,** 441–452 (1990).
(18) A. K. Kiritsakis, Flavor components of olive oil—A review, *J. Am. Oil Chem. Soc.,* **75,** 673–681 (1998).
(19) F. Angerosa, Influence of volatile compounds on virgin olive oil quality evaluated by analytical approaches and sensor panels, *Eur. J. Lipid Sci. Technol.,* **104,** 639–660 (2002).
(20) R. Aparicio and J. Harwood, *Manual of the olive oil* (Mundiprensa, España, 2003), p. 614.
(21) M. Uceda, M. P Aguilera, and I. Mazzuchelli, *Manual tasting and pairing of the olive oil* (Almuzara, España, 2010), p. 155.
(22) A. Romer, J. Tous, and L. Guerrero, "The sensory analysis of virgin olive oil," an *Introduction to Sensory analysis of food,* J. Sancho, E. Bota, and J. J. de Castro. Eds. (Universitat de Barcelona, España, 1999), pp. 183–197.
(23) COI, "Sensory analysis of olive oil. Standard. Guide for the selection, training and monitoring of skilled virgin olive oil tasters." International Olive Council COI/T.20/Doc. No. 14/Rev.2 (2007).
(24) COI, "Sensory Analysis of Olive Oil. Method for the Organoleptic Assessment of Virgien Olive Oil." International Olive Council, COI/T.20/ Doc. No. 15/Rev. 4 (2011).
(25) COI, "Sensory analysis of olive oil. Standard. Glass for oil tasting." International Olive Council, COI/T.20/Doc. No. 5 (1987).
(26) Skin Care Formulary Contents, *Cosmet. Toiletries.,* **118** (7), 70–101 (2003).
(27) Skin care Formulary, *Cosmet. Toiletries.,* **123** (1), 87–92 (2008).