Chapter 8

Italian National Database of Monovarietal Extra Virgin Olive Oils

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Additional information is available at the end of the chapter

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1. Introduction

The abundance of indigenous Italian olive germplasm, numbering over 800 cultivars [1] and rising, guarantees the ongoing production of high quality extra virgin olive oils, thus contributing to the preservation of much of the ancient genetic biodiversity of the olive.

The *Olea Europea* species has maintained much of its genetic diversity as a result of limited genetic erosion. This is due to breeding programs of this species having begun relatively recently compared to those of other fruit species.

Knowledge and development of the characteristics of Italian monovarietal extra virgin olive oils will also lead to an improvement in knowledge of the areas where these oils are produced, in turn developing tourism, a crucial sector for the Italian economy.

In Italy, new regulation was recently introduced forcing virgin and extra virgin olive oil producers to indicate the location of both olive harvest and oil production. More recently the European Commission has established compulsory standards for the labelling of origin for extra virgin and virgin olive oils (Reg EC n.182/2009). The significant increase in demand for extra virgin olive oils is due not only to the health benefits it offers, but also to its organoleptic properties; the large number of Italian olive cultivars allows for the production of different monovarietal oils marked out by a wide range of pleasant flavours.

As the genotype of origin affects the chemical and sensory characteristics of extra virgin olive oil deeply, the preservation and characterization of authocthonous cultivars and clones play a key role in the marketing of high quality olive oils.

Conservation of genetic resources for olives has important implications for both adaptation of the cultivars to their local environment and their agronomical performance under specific conditions. This also implies that every initiative to promote olive cultivation ought to take into consideration the local varieties and also that every region should preserve its own plant material to safeguard olive adaptation and productivity and to maintain the intrinsic characteristics of its olive oil which represent a deep connection with the territory of origin.

In the EU olive oils can be linked to the cultivar of origin and in turn to its area of production under the rules of the Protected Denominations of Origin (PDO) or of the European Protected Geographical Indication (PGI).

Several typical Italian extra virgin olive oils have qualified for PDO and PGI status, as many as 42 PDO and 1 PGI. Generally, these products are blends of different varieties according to the different cultivar percentage reported in the Product specification; some Italian PDO oils are obtained from the transformation of a single cultivar (monovarietal oils) for example the PDO Nostrana di Brisighella.

Italian olive cultivation is marked out by its extremely rich and varied varietal heritage. An important objective being pursued by every region is the protection and preservation of autochthonous Italian olive cultivars. This can be seen in the spread of regional varietal catalogs and also in the ongoing rise in the number of monovarietal olive oils taking part in the Italian National Review of Monovarietal olive oils as organized by ASSAM Marche [2].

In Italy this review serves to characterize monovarietal oils in terms of both chemical and sensory profiles. The organization of events, courses and forums involving olive farmers, crushers, consumers and catering operators has contributed to an improvement in the visibility of the market for Italian monovarietal olive oils. Studies into the quality of monovarietal oils increase the value of the product while showcasing the region of origin and educating the consumer about their nutritional and organoleptic value.

In Italy the market for monovarietal and organic oils is growing due to consumers paying greater attention to both flavour and health benefits of the product.

2. The Italian National Database

ASSAM and IBIMET-CNR have created and are managing a database of chemical and sensory profiles of extra virgin oils participating in the Italian National Review of Monovarietal olive oils. This dynamic database includes a large number of observations for each monovarietal oil, and can allow for ongoing updates every year, thus providing more accurate chemical and sensory average data for the oils. For each monocultivar oil, chemical and sensory profiles were calculated and described, including a large number of oil samples from different regions.

The Review reached its ninth edition as of 2004, and the large number of oil samples has led to improvements in results, in turn diminishing the effect of the main variables which

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have a significant influence on the quality of the oil: seasonality, ripening and different milling technologies.

Sensory analysis was laid out by the "ASSAM – Marche Panel" as recognized by the IOOC (International Olive Oil Council) and the Italian Ministry for Agriculture, Food and Forestry Policy under the conditions described in EC Reg. 640/2008.

The 150 samples collected during the first and the second year (edition 2004-2005) were used to identify the specific descriptors for the sensory analyses of monovarietal extra virgin olive oil and to set up the relative profile sheet [3].

Each panellist smelled and tasted the oil, in order to analyse olfactory, gustatory, tactile and kinaesthetic characteristics. Thirteen attributes were evaluated: 9 during the olfactory phase (olive fruity, olive fresh leaf, grass, fresh almond, artichoke, tomato, apple, berries and aromatic herbs) and 4 during the gustatory phase (olive fruity, bitter, pungent and fluidity). Attributes were assessed on an oriented 10-cm line scale and quantified measuring the location of the mark from the origin. Data obtained for the 13 descriptors were used to define the sensory profile of each sample using the median values [4].

Fatty acid composition, determined according to Reg. EC Reg.796/2002 methodology [5], and total phenolic content determined according to the Folin-Ciocalteu spectrophotometric method expressed as milligrams of gallic acid per kilogram of oil, were determined by Centro Agrochimico ASSAM, Jesi (AN).

Chemical and sensory data were processed using SAS 9.1.3 (SAS Institute Inc., Cary, NC, USA). Explorative analysis and descriptive statistics were performed for each set of data in order to identify outliers, extreme observations and to obtain distributional properties of the data. Descriptive measures (moments, basic measures of location and variability, confidence intervals for the mean, standard deviation, and variance) of chemical and sensory variables were calculated for each monovarietal oil.

Currently, the database includes 2092 oils produced from 130 different cultivars from 18 Italian regions. Nutritional properties, expressed as fatty acid and total phenol content, and the sensory profiles of each Italian monovarietal oil were published in the Catalogue of Italian Monovarietal oils [6] and at http://www.olimonovarietali.it

Below are listed the average sensory profiles of the 16 most represented monovarietal oils. The number of samples belonging to each cultivar are indicated in brackets: Ascolana Tenera (36 samples), Bianchera (34), Biancolilla (28), Bosana (133), Casaliva (39), Coratina (80), Frantoio (122), Itrana (102), Leccino (105), Mignola (38), Moraiolo (83), Nocellara del Belice (49), Peranzana (47), Piantone di Mogliano (57), Raggia (54), Ravece (101).

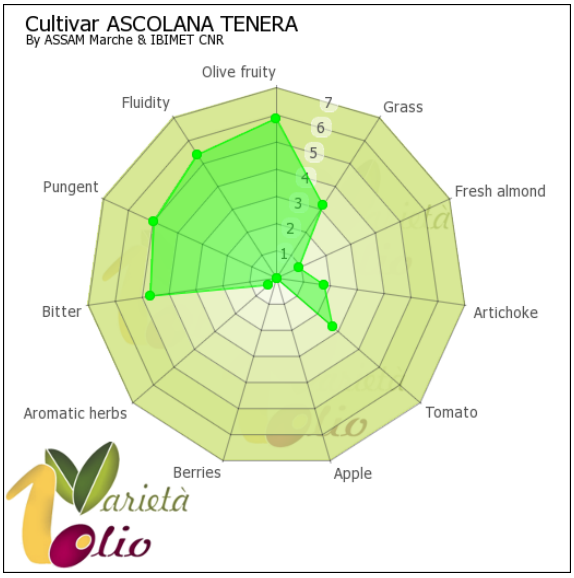

Figure 1. Ascolana Tenera – Marche region. Sensory profile: intense olive fruity, strongly grassy with hints of tomato and artichoke; balanced in taste, with medium intensity of bitter and pungent notes.

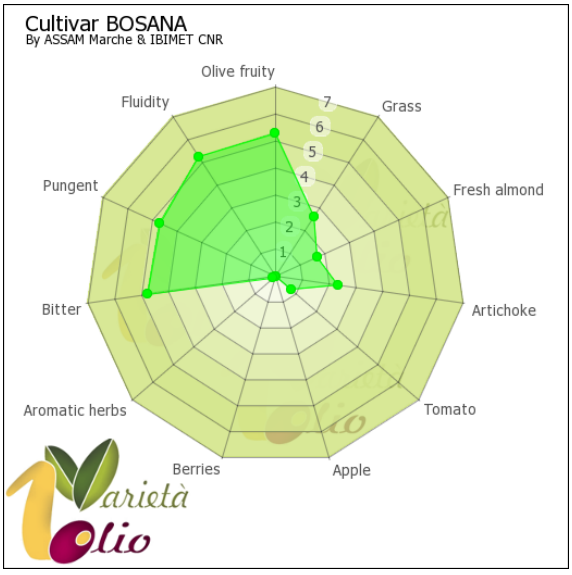

Figure 2. Bosana – Sardegna region. Sensory profile: medium olive fruity, grassy with prevalent scent of thistle and artichoke and hints of almond and tomato. Medium intensity of bitter and pungent notes.

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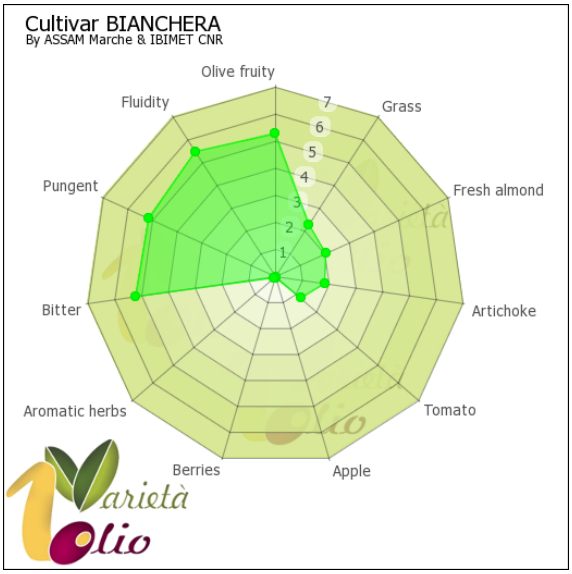

Figure 3. Bianchera – Friuli Venezia Giulia region. Sensory profile: medium-intense olive fruity, with grassy scent, artichoke, almond and tomato; medium bitter and pungent flavours.

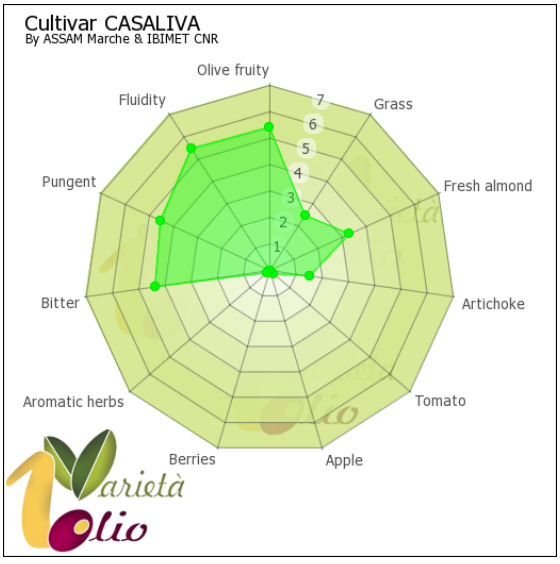

Figure 4. Casaliva – Lago di Garda area. Sensory profile: medium-intense olive fruity, with marked almond scent and light flavour of grass and artichoke; well balanced taste with medium intensity of bitter and pungent notes.

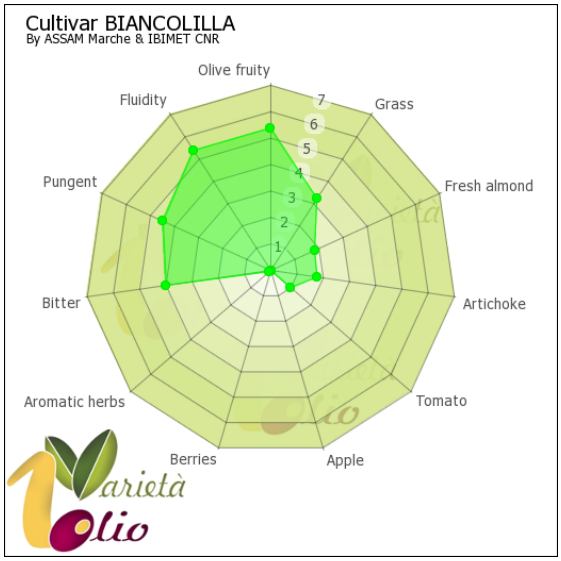

Figure 5. Biancolilla – Sicilia region. Sensory profile: medium-intense olive fruity, with a marked grass scent and light hint of almond, artichoke and tomato; bitter and pungent flavours are of medium-light intensity.

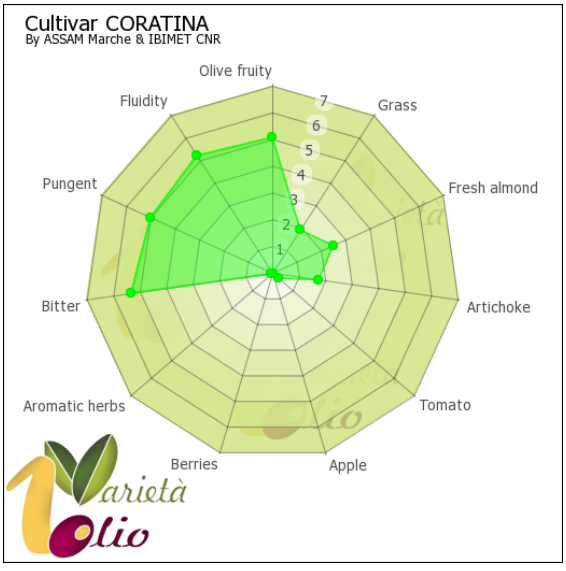

Figure 6. Coratina – Puglia region. Sensory profile: medium olive fruity, with a marked fresh almond scent together with notes of grass and artichoke; bitter and pungent flavours are of medium-high intensity.

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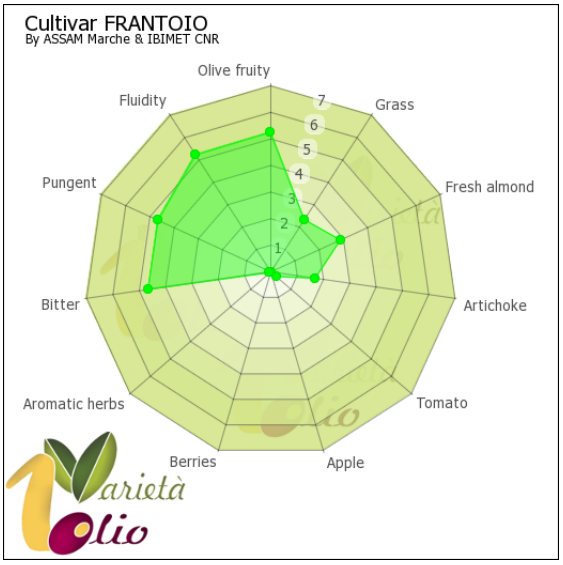

Figure 7. Frantoio – Central-North Italy. Sensory profile: medium-high olive fruity, with a marked fresh almond and and light flavour of grass and artichoke; bitter and pungent flavours are of medium intensity.

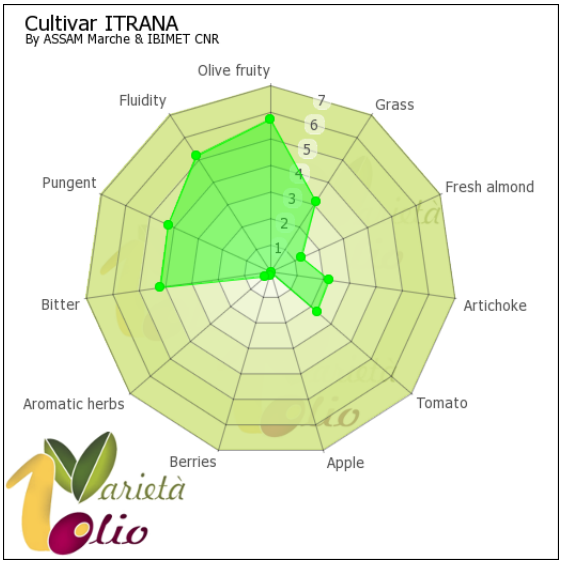

Figure 8. Itrana – Lazio region. Sensory profile: high olive fruity intensity, with grass, tomato and artichoke scent and light almond flavor; well balanced taste with a bitter and pungent medium-light intensity.

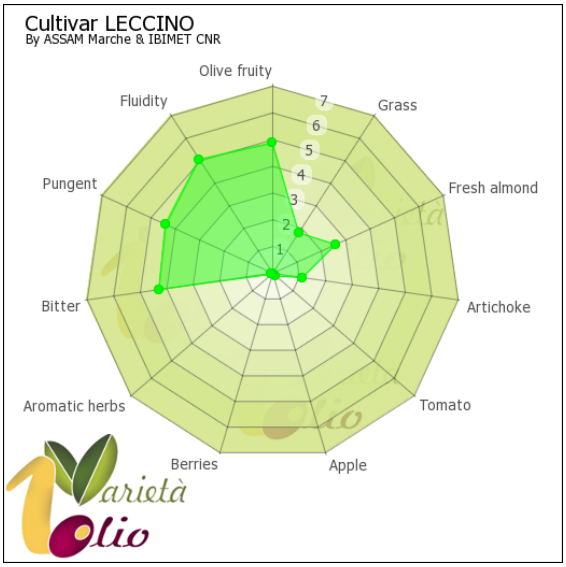

Figure 9. Leccino – North-central Italy. Sensory profile: medium olive fruity intensity, with almond scent and light grass and artichoke flavor; medium intensity of pungency and bitter taste

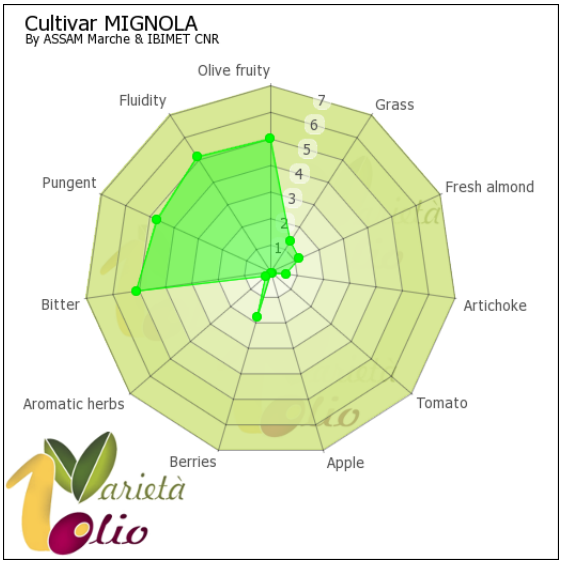

Figure 10. Mignola – Marche region. Sensory profile: medium olive fruity intensity, with a peculiar flavor of soft fruits; medium intensity of pungency notes and marked bitter taste.

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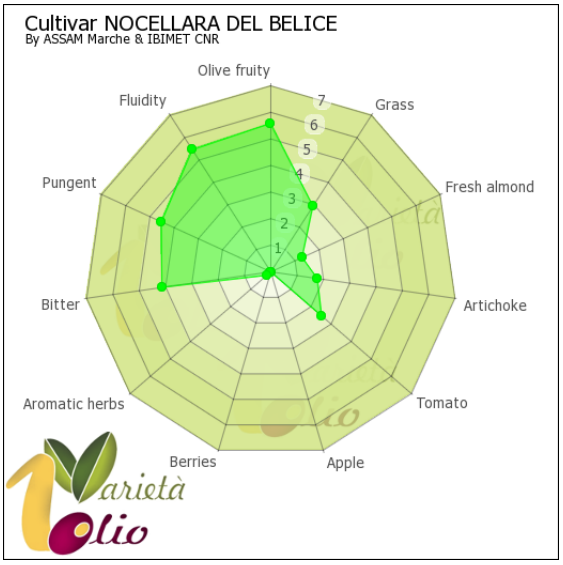

Figure 11. Nocellara del Belice – Sicilia region. Sensory profile: medium-high olive fruity intensity, with grassy and tomato notes and light scent of artichoke and almond; well balanced taste with medium intensity of bitter and pungency notes.

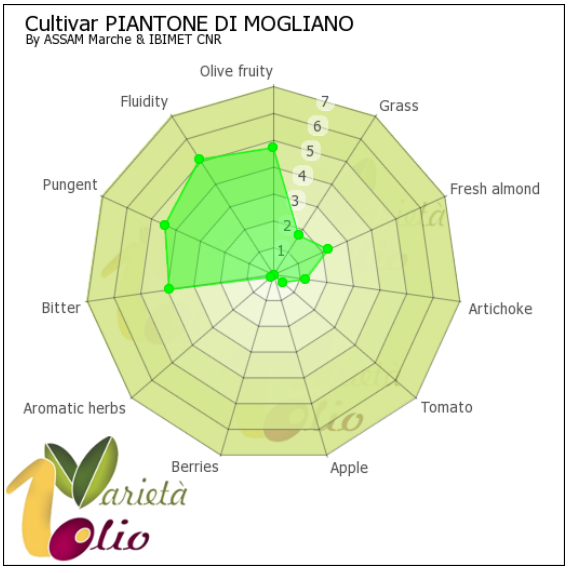

Figure 12. Piantone di Mogliano – Marche region. Sensory profile: medium olive fruity intensity, with almond scent; medium-light intensity of pungency and bitter taste.

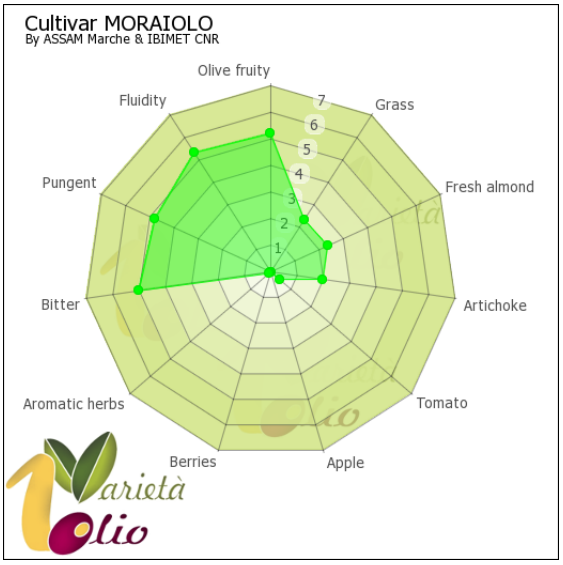

Figure 13. Moraiolo – Central Italy. Sensory profile: medium olive fruity intensity, with scents of grass, almond and artichoke; medium intensity of pungency and bitter taste.

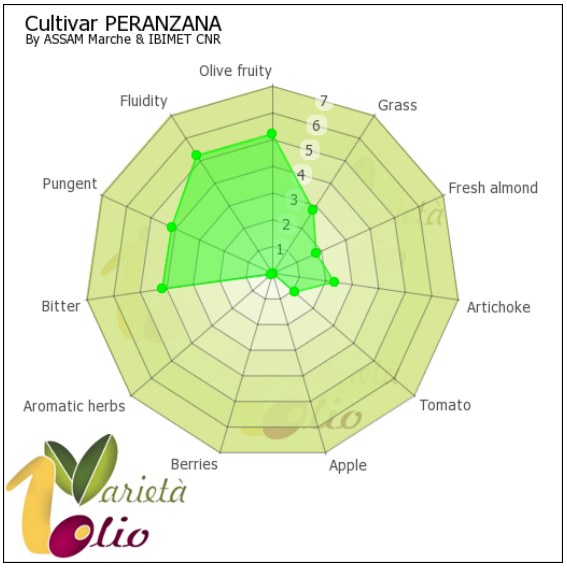

Figure 14. Peranzana – Puglia region. Sensory profile: medium olive fruity intensity, with scent of grass, artichoke, almond and tomato; medium intensity of pungency and bitter taste.

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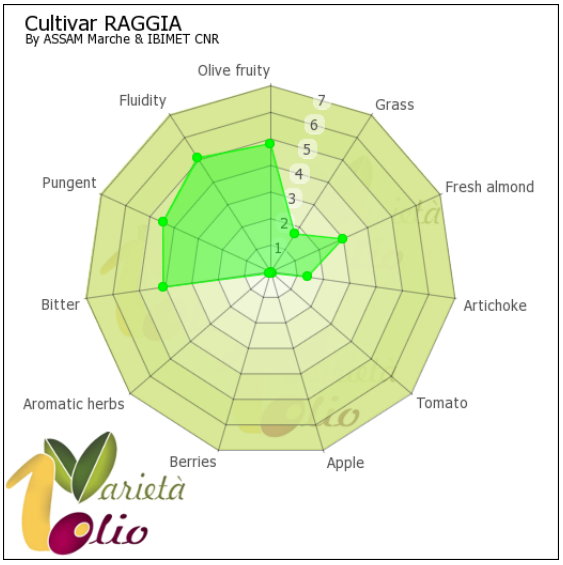

Figure 15. Raggia – Marche region. Sensory profile: medium olive fruity intensity, with strong green almond scent and light grass and artichoke flavor; well balanced to taste with medium intensity of pungency and bitter taste.

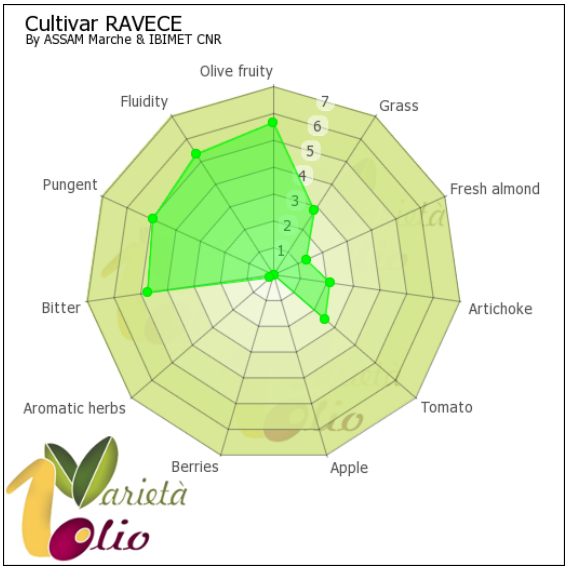

Figure 16. Ravece – Campania region. Sensory profile: medium-high olive fruity intensity, with grass, tomato and artichoke scent along with light almond scent; medium intensity of pungency and bitter taste.

3. The monovarietal olive oil quality and the influence of genetic matrix and of crop year on chemical and sensory profiles

The availability of this monovarietal oil database allows for a statistic elaboration of the data in order to meet different aims of the research into olive cultivation and olive oil quality. Some studies will be carried out considering the cultivars Frantoio and Leccino, which are widespread along the Italian peninsula, in order to evaluate the effect of the environment (climate, altitude and latitude) on the chemical and sensory profiles of monovarietal olive oils.

Moreover the quality and typicality of extra virgin olive oil are primarily determined by genetic, agronomical, environmental factors, and by technological parameters of oil processing [7,8,9]. Genetic matrix (cultivar) plays a key role in the chemical and sensory quality of the oil [10].

It is important to underline that a smaller number of studies has considered the seasonal effect on the chemical and sensory profile of olive oil. The seasonality, which is deeply related to the different climate events of the crop year, may influence the ripening process of olives, thus affecting the oil composition and the resulting quality of olive oil. This thesis is supported by a study carried out by IBIMET-CNR and ASSAM on the evaluation of the influence of the cultivar and seasonality, as well as their interaction on monovarietal oil composition.

The study was performed on 1108 monovarietal oils from the 16 most representative Italian cultivars.

Nutritional properties, expressed as fatty acid and total phenols contents, and the sensory profiles were considered.

The procedure was based on the analysis of variance (ANOVA) by a complete factorial design in order to examine treatment interdependencies (variety and crop year). A Principal Components Analysis (PCA) was also performed on chemical and sensory data separately, using mean values of each crop year of each cultivar collected.

Fatty acids with the highest index of variability (heptadecenoic, linoleic, oleic, stearic and palmitic) were selected according to their p-level and F-values and submitted to PCA.

Table 1 reports mean values and comparison of mean separation analysis of the fatty acids belonging to the 1108 monovarietal olive oil samples. Regarding oleic acid, the contents of which as reported to EC Official Reg. EC Reg.702/2007 [11] range from 55 to 83%, the range of oleic acid of oils considered in this study varied from 71% to 77% showing their high nutritional level, some cultivars such as Coratina and Itrana are characterized by the production with the highest amount of acid oleic (above 77%).

Considering organoleptic quality, Table 2 shows mean values and comparison of mean separation analysis of the sensory attributes of the monovarietal oils. All monovarietal oils have presented significant intensities of grass attributes with the highest levels of 3.2 noted in As-

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colana Tenera and Biancolilla. Considering the peculiar attributes, which are heavily cultivar–dependent, such as fresh almond, artichoke, tomato, aromatic herbs and berries [12, 13], oils produced by Coratina, Frantoio, Leccino, Moraiolo and Piantone di Mogliano are distinguished for their high intensity of fresh almond, a typical pleasant flavour which characterized these cultivars.

	Heptadecenoic	Linoleic	Oleic	Palmitic	Stearic	Total phenols
ASCOLANA T.	0.20c	6.10gh	75.57cd	13.42cd	1.98de	394def
BIANCHERA	0.10de	5.98h	76.26bc	12.70ef	2.52b	646a
BIANCOLILLA	0.25a	9.38b	71.92i	13.69bc	2.22c	327f
BOSANA	0.10de	10.07a	72.83h	12.71ef	2.09cd	440bcd
CASALIVA	0.10de	6.74e	76.84b	12.38fg	1.70fg	411cde
CORATINA	0.08f	7.07de	77.74a	11.24h	1.80efg	588a
FRANTOIO	0.10de	6.99de	76.09bc	12.77ef	1.81efg	495b
ITRANA	0.09def	6.17fgh	77.66a	12.06g	1.80efg	329f
LECCINO	0.11d	6.69ef	75.00ed	14.01b	1.74fg	414cde
MIGNOLA	0.10de	8.71c	71.42i	14.63a	1.84efg	503b
MORAIOLO	0.09def	7.41d	75.59cd	13.00de	1.68g	504b
NOCELLARA B.	0.11d	8.20c	73.73fg	12.85ef	2.63ab	358ef
PERANZANA	0.08ef	9.41b	73.30gh	13.00de	1.87efg	375def
PIANTONE M.	0.22b	6.55efg	76.58b	12.14g	1.97de	395def
RAGGIA	0.10de	7.49d	74.45ef	13.40cd	1.89ef	414cde
RAVECE	0.08ef	9.23b	73.28gh	12.51efg	2.78a	473bc

Table 1. Mean values and comparison of mean separation analysis (ANOVA) of the fatty acids relative to the 1108 monovarietal olive oil samples.

All monovarietal oils considered in this study presented a significant intensity of artichoke flavours.

Bosana, Peranzana, Itrana and Ravece oils exhibited the highest intensity, while in Piantone di Mogliano and Leccino oils, slight artichoke attributes were noted. With regard to this last attribute, oils of Ravece, Ascolana Tenera and Itrana are distinguished also for their high intensity of tomato flavour. Berries flavour characterized the oil produced by the Mignola cultivar.

All monovarietal extra virgin olive oil considered in this study were characterized by a significant level of bitterness showing a range from 3.9 to 5.3. In particular Piantone di Mogliano, and Biancolilla oils presented the lowest intensity of bitterness. It is interesting to underline that the same oils were also characterized by a lower total phenol content (see tab. 1). By contrast, the monovarietal oils of Coratina, Bianchera and Mignola which exhibited the highest intensity of bitterness, also showed the highest phenolic content.

	Olive fruity	Grass	Fresh almond	Artichoke	Tomato
ASCOLANA T.	5.9a	3.2a	0.9h	1.8bcde	2.7a
BIANCHERA	5.3cde	2.2def	2.1ef	1.6cdef	1.0c
BIANCOLILLA	5.4cd	3.2a	1.8f	1.8bcde	1.0c
BOSANA	5.3de	2.6bcd	1.7fg	2.3a	0.8cd
CASALIVA	5.4cd	2.4cd	3.3a	1.5defg	0.2e
CORATINA	5.1efg	1.9efg	2.5cde	1.7bcde	0.3e
FRANTOIO	5.2def	2.3de	2.9abc	1.7cdef	0.3e
ITRANA	5.7ab	3.1a	1.3gh	2.2ab	2.3b
LECCINO	4.8gh	1.8fgh	2.6bcd	1.1g	0.2e
MIGNOLA	5.0fg	1.4h	1.2h	0.6h	0.1e
MORAIOLO	5.2def	2.3de	2.4de	2.0abcd	0.4de
NOCELLARA B.	5.6bc	2.9ab	1.3gh	1.8bcde	2.5ab
PERANZANA	5.2def	2.8abc	1.8f	2.3a	1.1c
PIANTONE M.	4.7h	1.7gh	2.2de	1.2fg	0.4de
RAGGIA	4.8gh	1.7gh	3.0ab	1.4efg	0.1e
RAVECE	5.7ab	2.8abc	1.3gh	2.1abc	2.5Ab
	Berries	**Aromatic herbs**	**Bitter**	**Pungent**	
ASCOLANA T.	0.0b	0.4a	4.7cd	5.0ab	
BIANCHERA	0.0b	0.1c	5.1ab	5.2a	
BIANCOLILLA	0.0b	0.1c	4.0f	4.5cdef	
BOSANA	0.0b	0.1c	4.8bc	4.7bcd	
CASALIVA	0.0b	0.1c	4.3def	4.5cdef	
CORATINA	0.0b	0.1c	5.3a	5.0ab	
FRANTOIO	0.1b	0.1c	4.7cde	4.7bcd	
ITRANA	0.0b	0.3ab	4.2f	4.2ef	
LECCINO	0.0b	0.1c	4.3ef	4.4def	
MIGNOLA	1.8a	0.3abc	5.1ab	4.7bcd	
MORAIOLO	0.0b	0.1c	5.0abc	4.8bc	
NOCELLARA B.	0.0b	0.2bc	4.1f	4.5cde	
PERANZANA	0.0b	0.1c	4.2f	4.1f	
PIANTONE M.	0.0b	0.1c	3.9f	4.4cdef	
RAGGIA	0.0b	0.1c	4.1f	4.5cdef	
RAVECE	0.0b	0.2bc	4.7bcd	4.9ab	

Table 2. Mean values and comparison of mean separation analysis (ANOVA) of the sensory attributes relative to the 1108 monovarietal olive oil samples.

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Regarding the influence of the genetic matrix and the crop year in Table 3 we see that in all fatty acids analysed, the effects of the cultivar and crop year are highly significant. The effect of the interaction between the two factors is also highly significant on the content of fatty acid, with the exception of palmitoleic, heptadecenoic and heptadecanoic acids. Also the total phenolic contents are heavily influenced by both the cultivar and the year, as well as the interaction between the two factors. It is interesting to underline that both factors (cultivar and crop year) have similarly significant influence on the contents of the most important fatty acids as linoleic, linolenic, oleic, palmitic and palmitoleic.

For oleic and palmitoleic the main factor was, however, the cultivar, in fact ANOVA procedure explains the 68.30% and 70.32% of its variation respectively. The cultivar did not represent a great source of variability for linolenic acid: only 7.88%, while the crop year shows a variation of 85.95%.

Parametr	Cultivar	Crop year	Cultivar x crop year
Eicosanoic	24.34 ***	10.49 ***	65.17 ***
Eicosenoic	10.98 ***	80.78 ***	8.24 ***
Heptadecanoic	56.17 ***	20.08 ***	23.75 *
Heptadecenoic	82.95 ***	8.11 ***	8.94 ns
Linoleic	69.61 ***	20.07 ***	10.32 ***
Linolenic	7.88 ***	85.95 ***	6.17 ***
Oleic	68.30 ***	17.58 ***	14.12 ***
Palmitic	55.37 ***	27.72 ***	16.91 ***
Palmitoleic	70.32 ***	9.44 ***	20.24 *
Stearic	52.43 ***	39.64 ***	7.93 ***
Total phenols	51.32 ***	26.64 ***	22.04 ***

Table 3. Variability expressed as percent of the Total Sum of the Squares for fatty acid composition and total phenols. *, **, *** Significant F-values the 0.05 (*), 0.01 (**) or 0.001 (***) level, respectively; ns = nonsignificant.

The sensory profiles of the 1108 oil samples were submitted to the ANOVA procedure by a complete factorial design. The effect of the cultivar factor is highly significant on the sensory attributes. Olive fruity, grass, fresh almond, tomato and berries were strongly influenced by the cultivar. For these attributes the variability, expressed as percentage of the total sum of the squares, the cultivar factor is characterized by a range from 71.77% to 90.75%. In general the crop year factor for all the sensory attributes remains limited and the interaction with the cultivar is not significant with the exception of berries, bitter and pungent (table 4).

Parametr	Cultivar	Crop year	Cultivar x crop year
Olive fruity	71.77 ***	5.93 ***	22.30 ns
Grass	75.92 ***	2.54 ns	21.54 ns
Fresh almond	73.59 ***	9.81 ***	16.60 ns
Artichoke	56.96 **	15.38 ***	27.66 ns
Tomato	90.75 ***	1.48 *	7.77 ns
Berries	75.71 ***	0.99 **	23.30 ***
Aromatic herbs	26.86 **	10.17 *	62.97 ns
Bitter	49.02 ***	17.04 ***	33.94 ***
Pungent	26.35 ***	42.63 ***	31.02 ***

Table 4. Variability expressed as percent of the Total Sum of the Squares for sensory attributes. *, **, *** Significant F-values the 0.05 (*), 0.01 (**) or 0.001 (***) level, respectively; ns =not significant.

4. The Italian olive oil typology

The decision to carry out a study of a large number of labelled commercial extra virgin olive oils was taken in order to provide the consumer with information about the chemical and sensory properties of extra virgin olive oils which are currently available on the Italian market. The commercial potential of the monovarietal oils can be exploited either in terms of purity, relying on the specific characteristics of the single cultivar, or mixing the monovarietal oils from each cultivars as a "blend" based on the different typologies of Italian olive oil.

For this purpose these oil typologies were assessed by clustering the collected olive oil data according to different sensory profiles. Descriptive analysis and hierarchical cluster analysis of sensory characters were performed. Monovarietal oils were clustered in six different sensory typologies emphasising the variability and the depth of aromas characterising Italian Monovarietal oils.

Such classification of monovarietal oils typologies may help the consumer in making an informed choice, and in matching more easily with the wide range of flavours found in Italian cuisine.

These monovarietal oils were classified as belonging to typology 1:

Caninese, Carboncella, Carpellese, Cornetta, Dolce Agogia, Dolce di Rossano, Dritta, Gentile di Chieti, Gentile di Larino, Leccino, Limoncella, Nebbio, Ogliarola, Ogliarola del Bradano, Paesana Bianca, Piantone di Mogliano, Raggia, Raggiola, Rajo, Razzola, Rosciola, Salviana, Sargano di Fermo, Taggiasca.

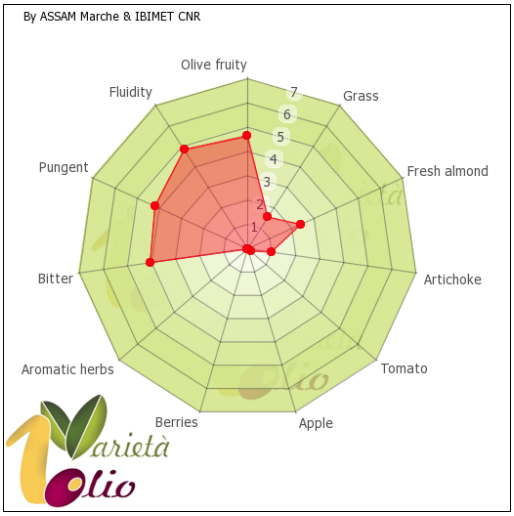

Figure 17. Typology 1 Sensory profile: medium olive fruity intensity, with prevalent almond scent and light notes of grass/leaf and artichoke; pungent and bitter taste of medium-light intensity.

These monovarietal oils were classified as belonging to typology 2:

Casaliva, Coratina, Correggiolo, Frantoio, Moraiolo, Ogliarola Garganica, Oliva Nera di Colletorto, Olivastra Seggianese, Pendolino, Raggiolo, Razzo, San Felice, Sargano di Ascoli.

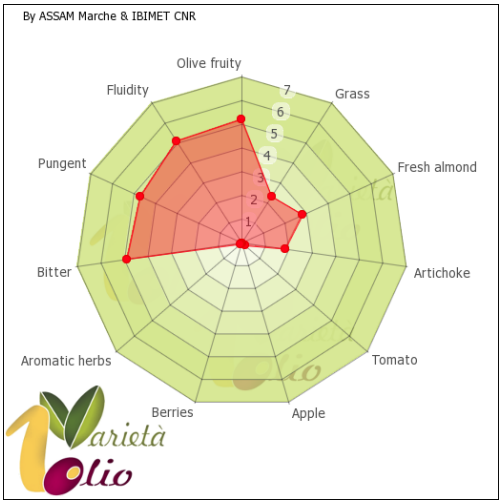

Figure 18. Typology 2 : Sensory profile: medium olive fruity intensity, with prevalent almond scent and light notes of grass/leaf and artichoke; pungent and bitter taste of medium intensity.

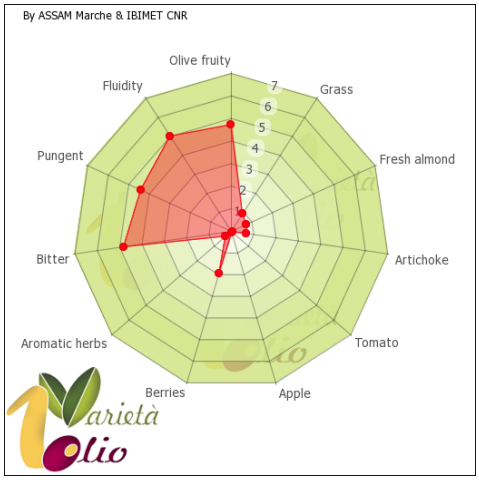

Figure 19. Typology 3 Sensory profile: medium olive fruity intensity, with peculiar soft fruits scent; pungency and bitter taste of medium intensity.

These monovarietal oils were classified as belonging to typology 3: Cellina di Nardò, Mignola, Ogliarola Salentina

These monovarietal oils were classified as belonging to typology 4: Biancolilla, Bosana, Carolea, Coroncina, I77, Majatica di Ferrandina, Maurino, Orbetana, Peranzana, Prempesa, Salella, Semidana, Tonda del Matese.

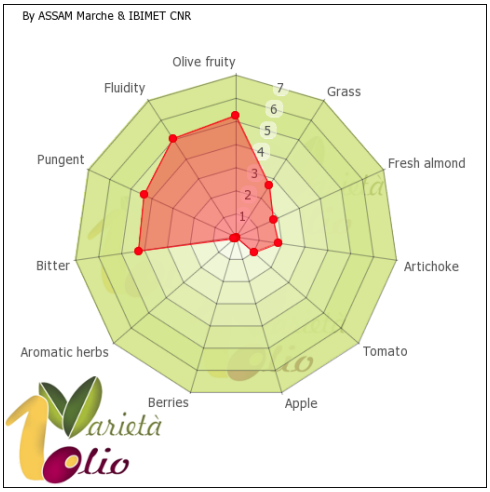

Figure 20. Typology 4 Sensory profile: medium olive fruity intensity, with scent of grass, artichoke fresh almond and tomato; pungency and bitter taste of medium light intensity.

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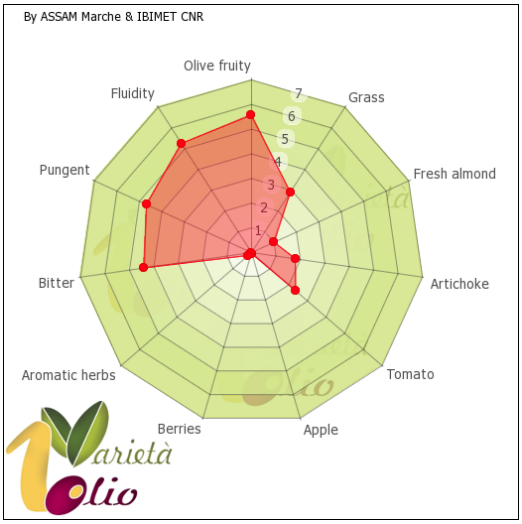

Figure 21. Typology 5 Sensory profile: medium high olive fruity with grassy notes, tomato and artichoke scent and light flavour of fresh almond; pungency and bitter taste of medium intensity.

These monovarietal oils were classified as belonging to typology 5. Ascolana Tenera, Cerasuola, Ghiacciolo, Itrana, Nera di Oliena, Nocellara del Belice, Nocellara Etnea, Nocellara Messinese, Ortice, Ravece, Tonda Iblea

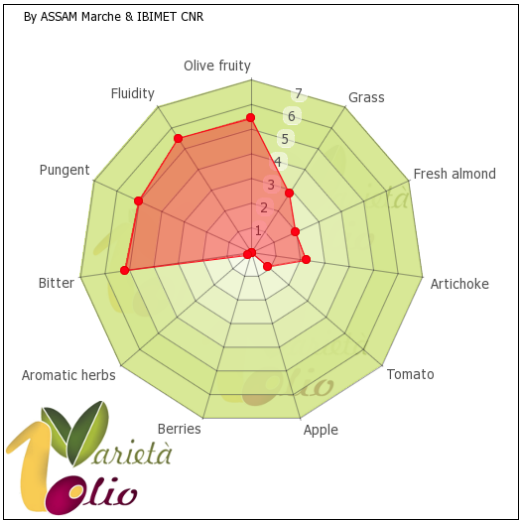

Figure 22. Typology 6 Sensory profile: medium high olive fruity with grass/leaf and artichoke notes, light flavor of fresh almond and tomato, medium intensity of bitter and pungency taste.

These monovarietal oils were classified as belonging to typology 6: Bianchera, FS17, Intosso, Lantesca, Leccio del Corno, Nostrana di Brisighella, Piantone di Falerone, Picholene

5. Conclusions

At a national level the varietal biodiversity culture is being promoted ever more heavily, resulting in increasing diversification of production of extra virgin olive oil which constitutes the necessary basis for creating blends and PDOs which appeal to consumers.

Various Italian regions are conducting research into the promotion of the genetic heritage of the olive cultures, drawing on social and cultural elements of olive culture. For a strong and healthy olive culture, the cultivation process should not only fulfil the demands of intensification and optimization of production, but also balance this with respect for the ancient traditions and heritage- traditions and heritage which we see throughout Italy in the form of monumental trees, archaeological exhibits, ancient tools and gastronomic traditions which have extra virgin olive oil at their very heart.

Development of olive production with care being taken to respect biodiversity and cultural traditions- and, as a consequence, the different autochthonous genotypes- is key to ensuring sustainable and environmentally friendly olive production processes.

The will to proceed with recovery and exploitation of Italian germplasm, encourages the development of marginal areas, but also allows for the protection of biodiversity and ecological systems in specific areas where the olive tree plays an important role for buoyancy and hydro-geological protection for the characterization of the landscape.

The exploitation of monovarietal oil results in the propagation of many native Italian varieties involving research institutes, University and nurseries called upon to halt the erosion of genetic heritage of Italian olive.

The unique Italian monovarietal heritage plays a key role in the "diversification" culture that should guide Italian production in order to avoid the standardization of products recently observed in the GDO market. The promotion of the "diversification" culture has to be reached both by increasing the cultivated land – and also discouraging the substitution of pre-existing cultivar or the implantation of new "universal" ones with the sole aim of greater production - and by the reinforcement of the elements that characterize GDO territoriality: organoleptic and sensorial diversification.

The quality oil market is expanding and Italy is still the reference point at an international level. The operators of the production chain and national institutions have the task of developing appropriate strategies to strengthen the position of production, sales and marketing.

As has happened in the case of wine, the varieties typical to these regions may become a symbol of high quality product and find a better place in the market.

This approach can be a first step toward traceability and authenticity of these particular productions in order to protect the interest of both consumer and producer.

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The authors are aware of the numerous variables: mill typology, olive ripening index and agronomic practice, which influence the overall olive oil quality. These variables are not usually known for commercial oils.

Knowledge of the chemical and sensory profiles of the Italian monovarietal olive oils could potentially start a certification process for these oils, thus leading to greater guarantees of origin and consequently greater guarantees of quality for the consumer.

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