THE QUALITY OF OLIVE OIL PRODUCED UNDER THE SUPER HIGH DENSITY SYSTEM (SHD)

"Potential and prospects from the point of view of Olive Oil Quality"

Alessandro Mersi www.olivolio.net - info@olivolio.net

Technical Consultant on Olive Growing, Milling Techniques and Systems, and Olive Oil Quality.

Olive growing is going through a process of change worldwide. Innovation has become a vitally important concern for a sector that has long been at a standstill and affected by crises and ongoing economic difficulties. The modern cultivation techniques used in the super high density (SHD) system are being rapidly disseminated and becoming statistically significant, both in countries where olive-growing is a traditional crop such as Spain, and in a series of new and interesting productive areas (Chile, Portugal, Morocco, the United States, etc). Only Italy, beset by a number of traditionalist, policy-setting and economic difficulties, has been left behind, watching from a distance and facing the risk of losing its role as the world's leading producer of olive oil. There can be no doubt that the country at the forefront of this innovative olive growing system is Spain, which following 15 years of researching and experimenting by private entrepreneurs, has developed a new, modern and efficient approach to olive growing. It is particularly in recent years, however, that SHD olive cultivation has grown most, and not just in numbers: in terms of agricultural science, production techniques are being continuously improved by adapting them to different productive conditions throughout the world. Leading harvesting-machine manufacturers have been quick to understand the importance of this new trend and are constantly improving their technology, particularly in regard to models designed specifically for olive harvesting. From the standpoint of olive varieties too, much research is being done in public-sector centers such as Cordoba University in Spain and in private-sector companies such as Agromillora, who in conjunction with researchers and sector professionals around the world are conducting a major research and development program on new varieties and clones of internationally used Spanish varieties to assess their adaptability to the SHD system. This aspect is extremely important, since the greater the number of varieties available, the more the SHD system will be in a position to meet a wide range of production demands by diversifying olive quality. On comparing traditional and super high density olive growing, the SHD system's technical and agricultural superiority provides obvious, major economic advantages. SHD cultivation, which is based on a high density of trees per acre, depends on optimum soil use, greater genetic efficiency of olive varieties and adaptability to high mechanization, which in turn lead to a drastic cutback in agricultural management costs, particularly as regards pruning and harvesting. Furthermore, on extending the comparison to olive-oil quality, there can be no doubt that SHD system is more efficient and provides greater potential for improving oil quality than traditional methods. That is particularly true at harvesting time because of harvesting speed, timely harvesting when different olive varieties are ripe, and immediate milling. The advantage of the SHD system lies in the use of mechanical harvestors which are swift and highly efficient. In fact in some growing areas it is possible for just two operators to harvest up to 9 tons of olives per acre in a matter of 2 to 3 hours. (Editor's Note: In California we witness 5-6 tons/acre in under one hour).

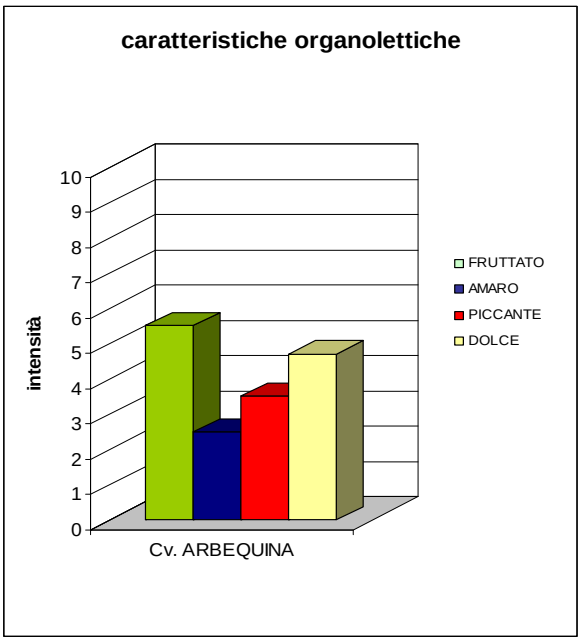
That remarkable harvesting capacity makes it possible to pick large quantities of olives with a perfect degree of ripening even on large-scale plantations, and in some cases olive processing can be carried out immediately, since it is becoming increasingly common in SHD plantations to build on-site olive oil mills. In SHD plantations different varieties are planted separately, harvested separately and processed and stored separately, so as to make blending easier in keeping with each company's marketing requirements. This makes it possible to produce oils covering the entire scale of fruitiness, ranging from light to medium to intense, and to be in a position to meet all consumer and market demands. In the near future, as more olive varieties become available, the SHD system will also help to further optimize olive oil quality, since it will be possible to produce high quality extra virgin olive oil with lower management costs, while also providing each country, region and even farm, with a more distinctive characterization and differentiation, and therefore to market their blends on international markets. Another very important consideration that closes the cycle is the choice of processing system. The final chemical and organoleptic characteristics of olive oil depend on several factors: the production ecosystem (soil and climate) olive varieties (whose physical state and degree of ripeness also vary), and milling techniques and systems, which have a bearing on the oil's chemical and organoleptic profile. A careful, professional choice of the most suitable processing system based on the productive environment, the varieties used and market needs, makes it possible to change the oil's sensory profile by emphasizing certain characteristics or diminishing others in order to maximize oil quality, and therefore economic benefits. Leading manufacturers of oil-mill machinery have become aware of the potential of SHD olive growing and are focusing increasingly on designing machines that combine high productivity with a high-quality end product. We will now analyze the oil produced by three clones of the three varieties being used in super-intensive olive growing: Arbequina Agromillora (Nurstech) Selection, Arbosana I-43 and Koroneiki I-38. The following chart shows the chemical, organoleptic and sensory characteristics of each oil. The three oils sampled, which were produced in Spain during the 2007 harvest, were made using optimum technical criteria, particularly as regards harvesting, which was carried out with the right degree of olive ripening and milled immediately. Based on the great importance and strong influence of milling and extraction/pressing techniques on organoleptic-sensorial characteristics and on the final quality of the olive oil produced, uniform samples have been examined in reference to the main processing parameters (paste temperature and whisking time, etc.) Chemical studies were conducted in Spain by specialized laboratories, whereas the sensory analysis was carried out by professional Italian tasters under my supervision.

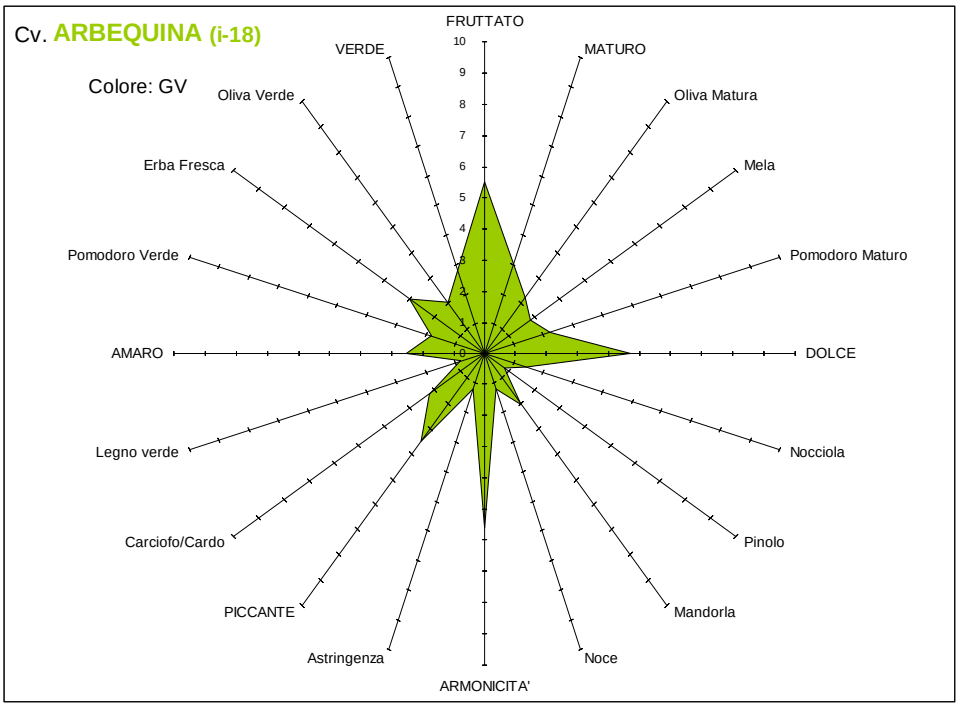
DESCRIPTION OF OIL CHARACTERISTICS AND SENSORY ATTRIBUTES

ARBEQUINA (Agromillora Nurstech Selection)

On visual inspection, the oil obtained from the Arbequina variety (Agromillora Selection clone) — the main Spanish super-intensive variety—is a light yellow with green tints. In terms of smell it has a fairly clean and persistent fresh fruitiness with evident herbaceous tinges, whereas, conversely, in taste sweet sensations prevail: apple, olive and ripe tomato, together with almond and hazelnut, are more prevalent than the freshgreen sensations of artichoke/cardoon, olive and green tomato. Astringency is also light, and bitterness is soft, with optimum overall harmony.

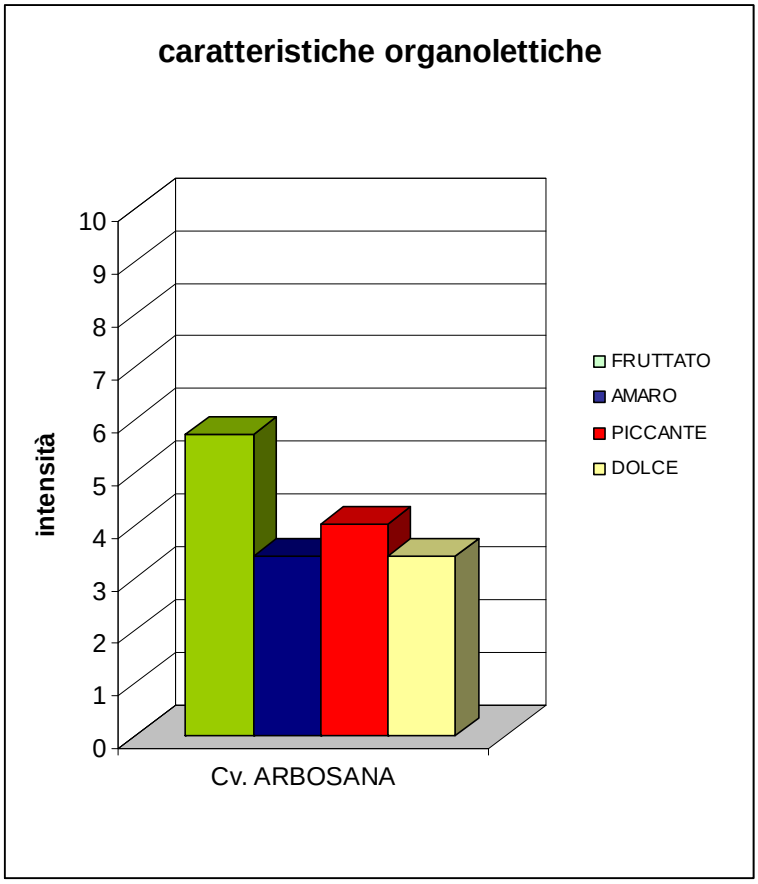
It is a decidedly pleasant olive oil, which by virtue of its delicate nature is also well balanced. Its markedly neutral, light characteristics make Arbequina Agromillora (Nurstech) Selection a “universal” oil. This is particularly interesting from a strictly commercial standpoint, because it can meet the needs of most markets throughout the world. It is also an “ideal” base for making a wide range of products creating blends with other intensive olive oils, even those with opposite characteristics. The “natural” affiliation of Arbequina oil to the “light fruity” category has also been verified in chemical analyses through the relative values of the percentage of oleic acid (71.10%) and above all total polyphenol content (167 mg/kg *), which is not very high. The polyphenol content could give this monovariety oil limited stability over time. From the professional and oil quality point of view, however, specific deficiency can easily be corrected by blending it with fairly low percentages of other particularly intense oils rich in phenolic substances (Koroneiki). From the gastronomic point of view, “pure” Arbequina oil lends itself to all dishes that require a delicate condiment, and is therefore ideal on broiled and charcoal-broiled fish, salads, cheeses and fresh pasta.

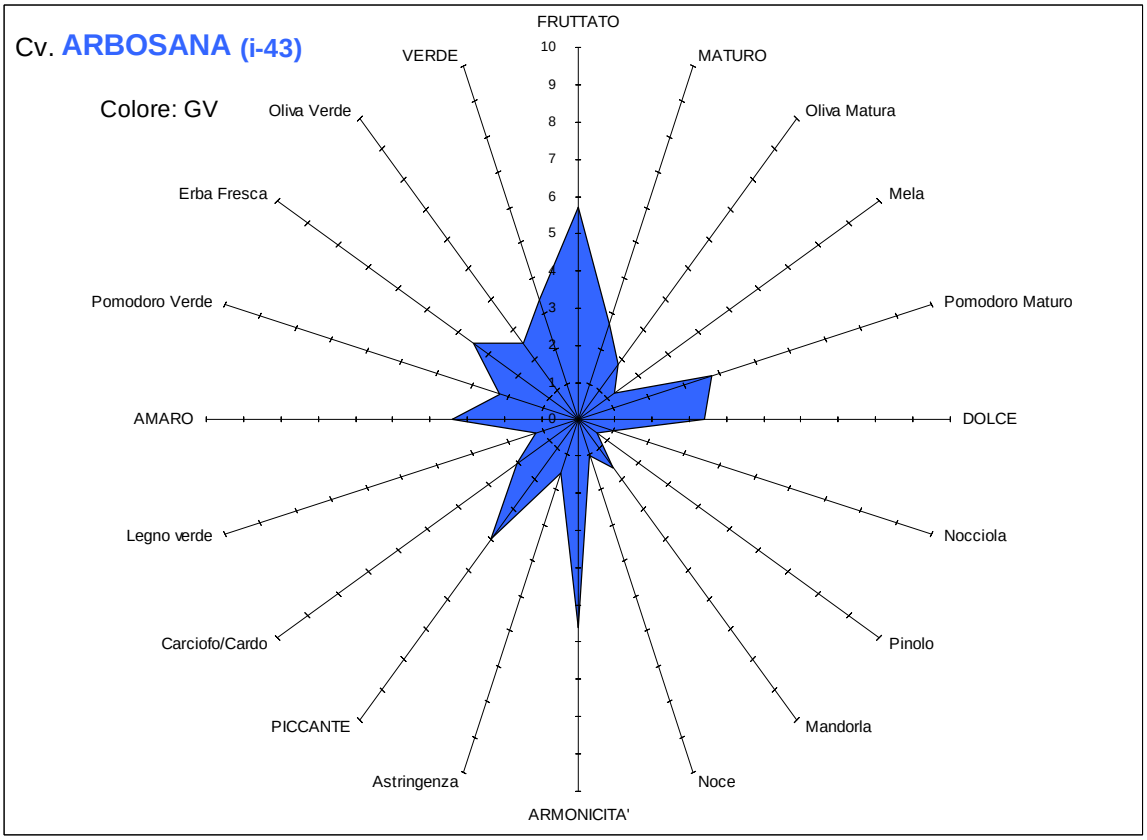




ARBOSANA (I-43)

On visual inspection, the oil obtained from the Arbosana variety (clone I-43) was a yellow or golden color with green tints. In terms of smell it clearly demonstrated a green tomato fragrance with an herbaceous background. In terms of taste it showed a medium harmonious fruitiness with an optimum balance between green/fresh and sweet/mature sensations. A perception of artichoke, green olive and fresh herb was intrinsic, together with olive and ripe tomato against a background of dry fruit (almond, nut and hazelnut). A spicy sensation was very evident and pleasant, with bitterness and sharpness definitely less intense. The results of the chemical analyses were also good, with fairly high oleic acid (74.5%) and overall polyphenol (278 mg/kg*) content, which therefore place Arbosana variety oil in the “medium fruity” category. In short, Arbosana I-43 olive oil has an optimum sensory balance and a marked variety characterization, but in this case this does not limit its appeal and its suitability to all culinary purposes and/or blending with other kinds of oils.

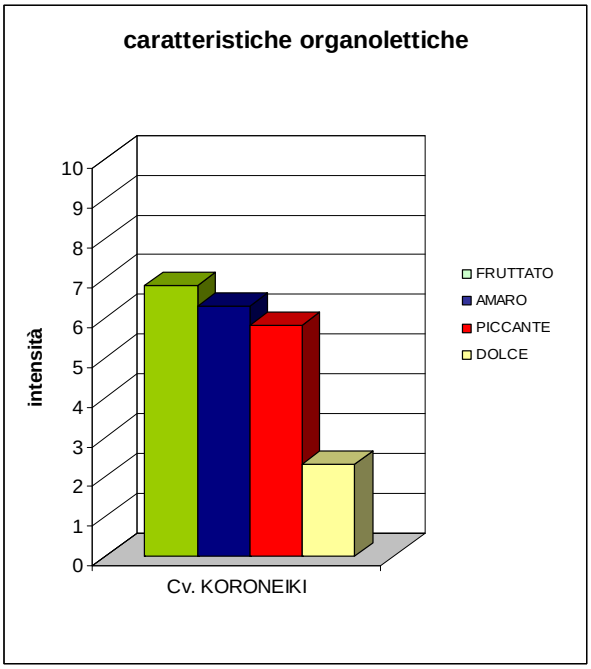

caratteristiche organolettiche
intensità
10
9
8
7
6
5
4
3
2
1
0
Cv. ARBOSANA
FRUTTATO
AMARO
PICCANTE
DOLCE

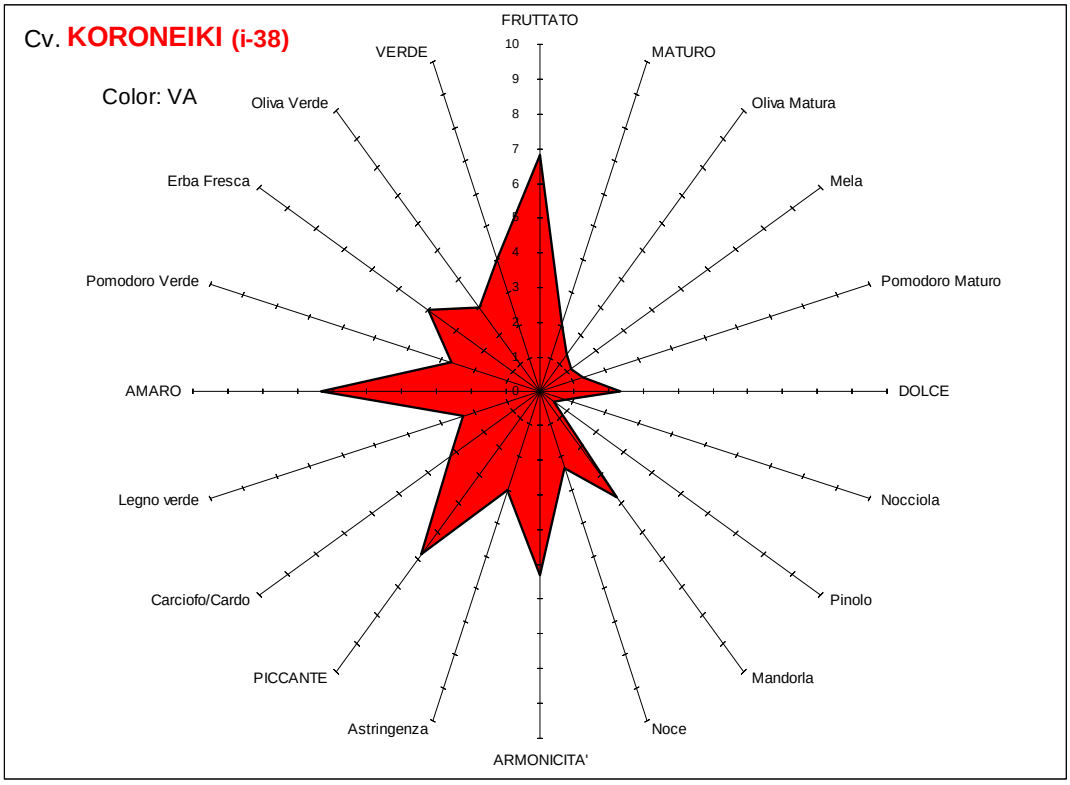

Cv. ARBOSANA (i-43)
Colore: GV
FRUTTATO
VERDE
MATURO
Oliva Verde
Oliva Matura
Erba Fresca
Mela
Pomodoro Verde
Pomodoro Maturo
AMARO
DOLCE
Legno verde
Nocciola
Carciofo/Cardo
Pinolo
PICCANTE
Mandorla
Astringenza
Noce
ARMONICITA'
10
9
8
7
6
5
4
3
2
1
0

KORONEIKI (I-38)

The oil produced by the Koroneiki (clone I-38) variety, which is of Greek origin, is characterized by a greengold color and by medium-intense fragrance, whereas in terms of taste its fruitiness is markedly intense. In terms of aroma, it gave off persistent herbaceous notes and long aromatic almond notes. In terms of taste, it immediately showed intense perceptions dominated by green and spicy sensations (fresh herb, olive and green tomato) and a clear after-taste prevalence of bitter and tart notes (artichoke cardoon and green wood). Its spiciness was very strong, while bitterness was potent and persistent on the palate. This oil has a strong personality and a very particular taste, and for this reason and its rather "extreme" characteristics, does not have a particularly high level of harmoniousness. This general appraisal changes on examining its chemical values.

The high oleic-acid content (78.18%) and above all the high concentration of polyphenols (600 mg/kg*) –natural anti-oxidant substances—make the olive oil from this variety truly excellent as compared to the other two we have examined. Strictly from an oil-quality point of view, Koroneiki oil is an outstanding "blending" oil and therefore has the capacity, in small percentages, to "revitalize" any type of oil through a "natural" injection of aromatic, antioxidant substances. At the same time, it can be highly appreciated in demanding markets that are used to "intensely fruity" olive oils.





The sensory analyses show that the three olive oils produced using the varieties currently in use in the SHD system are clearly distinguishable from each other and, by virtue of their organoleptic characteristics, can cover the entire range of fruitiness. In fact, in the case of the Arbequina variety, which is considered a light fruity oil, a medium intensity can easily be obtained in some production ecosystems using certain milling techniques. The use of just three varieties to meet productive and market demands throughout the olive-growing world may be considered rather limited, but it is worth pointing out that fortunately the system is already selfsufficient with these varieties alone. To understand this concept better, we can refer to the example of the three primary colors (yellow, blue and red) which of themselves are enough for the NTSC system, in use in all video systems (televisions, screens, etc.) to recreate a virtually infinite range of colors. Similarly, by blending the three oils using different percentages of each and/or optimizing milling and extraction techniques, one can produce a large, diversified range of oils. In conclusion, we will describe some examples of particularly interesting blends of oils of the three varieties. A small percentage of Koroneiki added to an Arbequina base makes a very interesting oil. By progressively increasing the blending percentage, a medium-light fruity oil can be turned into medium-intense, with the possibility of producing a full commercial range. In the specific case of the three varieties under study, which in themselves are high-quality oils, it is not difficult to produce high-level blends that can compare favorably with world-class extra-virgin oils. For instance, a “prototype” based on Arbequina with a fairly consistent percentage of Arbosana and a smaller amount of Koroneiki leads to a truly complex, extraordinary medium-intense fruity oil with great harmony and optimum balance, making for a really excellent oil that can hold its own in the most prestigious contests around the world. It should be emphasized that such results can only be achieved by optimizing the entire process through appropriate plantation and crop management, using the latest milling techniques and painstaking, professional oil-quality management.

These technical considerations, which are difficult to achieve through traditional olive-growing methods, are easily implemented “naturally” through the SHD system. The above is confirmed through an analysis of chemical values regarding acidity and the number of peroxides (oxidation ratio). These specific values, unlike others stemming mainly from the variety of olive, the production ecosystem and the milling system, can be directly and strongly influenced by the physical state of the olives on processing. The three oils analyzed reflect the highly uniform and particularly low values that characterize high-quality products. This is the last important confirmation of the effectiveness of the SHD system and its superiority over the traditional system, especially as regards its highly efficient, clean harvesting and effective approach to olive tree health management.

TABELLA DI COMPARAZIONE SUI PARAMETRI CHIMICI DEGLI OLI DELLE PRINCIPALI VARIETA' SUPER INTENSIVE

VARIETA':	Provenienza:	Data Frangitura:	K 232	K 270	Acidità:	Perossidi:	Analisi GC degli Esteri Metilici degli Acidi Grassi						Polifenoli:
					% Libera Ac.Oleico	n° meq O2/Kg	Palmitico C16:0	Palmitoleico C16:1	Stearico C18:0	**Oleico** C18:1	Linoleico C18:2	Linolenico C18:3	Ac.Caffeico mg/Kg
ARBEQUINA	*(SPAGNA)*	*Inizio Nov. 2007*	1,46	0,09	**0,19**	**4,0**	14,02	1,40	1,49	**71,10**	11,70	0,78	**167**
ARBOSANA	*(SPAGNA)*	*Inizio Nov. 2007*	1,52	0,09	**0,21**	**6,8**	12,96	1,44	2,17	**75,40**	6,00	0,54	**278**
KORONEIKI	*(SPAGNA)*	*Inizio Nov. 2007*	1,54	0,12	**0,16**	**5,6**	10,77	0,75	2,75	**78,18**	5,91	0,62	**600**

CONCLUSIONS:

After analyzing the chemical, organoleptic and sensory characteristics of the three oils, we can say that under optimum conditions and taking excellence as a benchmark, all three meet all the requirements needed for high quality, and not only show the same standard of quality but are superior in the main to the oils produced through traditional olive growing methods. However, the biggest difference that has led to a genuine technical and economic revolution in the sector is that, due to the drastic reduction of management costs, olive oils produced using the SHD system can be marketed at lower price levels that are acceptable to most consumers while still providing growers with satisfactory profit margins. In fact in some cases certain olive oils from well structured large-scale olive holdings in favorable agricultural areas can be marketed at similar or very slightly higher prices to those sold by major distributors of current “commercial” oil brands. Their quality is so obviously superior to that of mainstream commercial brands that it can be noticed by the average consumer. A reasonable sale price would make it easy to promote “real and genuine” extra virgin olive oil on world markets.

OLIVOLIO
OLIVICOLTURA ED ELAIOTECNICA

Alessandro Mersi

Via Valdelsa 13 - 53011 Castellina in Chianti (SI)

Tel. Fax. 0577-741255 – Cell. 0339-1845835

http: www.olivolio.net

e-mail: info@olivolio.net