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**EVALUATION OF EXPERIMENTAL WINES
OBTAINED FROM “NEW-OLD” WHITE-BERRY GENOTYPES
OF THE NORTHERN PROVINCE OF THE APULIA REGION
(DAUNIA, ITALY)**

**ÉVALUATION DE VINS EXPÉRIMENTAUX OBTENUS
DE GÉNOTYPES « NOUVEAUX-ANCIENS » A BAIE BLANCHE
DANS LA PARTIE SEPTENTRIONALE DES POUILLES
(DAUNIA, ITALIE)**

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Summary

In the Northern province of the Apulia Region (Foggia, syn. Daunia, Italy), several old white winegrape genotypes were found. The potential quality of some of them was tested by obtaining, for the first time, some experimental wines. In the present trial, grapes of the genotypes named ‘Malvasia Bastarda’, ‘Squaccianosa’, ‘Tuccanese Moscio’ and ‘Selvaggio’ were wine-processed separately. ‘Selvaggio’ grapes, very rich in polyphenols, were treated by pre-fermentative cold maceration in order to assess their suitability to produce “orange wine”. Grapes of all genotypes, mixed with those of other two varieties, named ‘Uvarilla’ and ‘Palumma’, were used to produce a blend-wine. Moreover, in order to compare the characteristics of these wines with those of wines obtainable by two well-known winegrape genotypes, cvs Bombino Bianco and Falanghina were also enclosed in the trial. The wines were analyzed to assess standard physical and chemical parameters, to detect their main aromatic compounds and to evaluate their sensory properties. Physical and chemical characteristics were found normal for wines obtained by small-lot winemakings. Malvasia Bastarda and, to a lesser extent, the blend-wine, tended to be more alcoholic (about +0.8 %vol.); Selvaggio and Squaccianosa wines had the highest total dry extract. The concentrations of aromatic compounds were below the perception threshold; however, on the whole, the grape blend, followed by ‘Tuccanese Moscio’ and ‘Malvasia Bastarda’ grapes, gave wines relatively richer in these volatile molecules; their concentrations were generally similar or higher than in Bombino Bianco and lower than in Falanghina. At the sensory evaluation, Selvaggio wine showed the highest color intensity and tonality, as expected due to its winemaking style. The blend-wine showed the

most marked floral aroma, followed mainly by Squaccianosa, Tuccanese Moscio and Bombino Bianco. The blend wine was also the most appreciated for aroma purity and intensity; moreover, it had the best score for harmony, followed by Squaccianosa and, together with Selvaggio, it was rated higher for bodiness. As total judgement the blend-wine was preferred followed by Squaccianosa and, thereafter, by Tuccanese Moscio, thus, the two latter genotypes would seem most suitable to produce mono-variety wines.

Key words

Old grapevine varieties, grape and wine composition, small-lot winemakings, volatile compounds, sensory analysis, new wine style

Résumé

Dans la partie la plus septentrionale des Pouilles (l’ancienne Daunia avec chef-lieu Foggia) plusieurs anciens génotypes à baie blanche ont été repérés. À la suite d’une première vinification expérimentale, la qualité potentielle de quelques-uns a été évaluée, et précisément celle des génotypes connus sous le nom respectivement de ‘Malvasia Bastarda’, ‘Squaccianosa’, ‘Tuccanese Moscio’ et ‘Selvaggio’. Seulement les raisins de ‘Selvaggio’, très riches en polyphénols, ont été soumis à une macération pré-fermentative à froid dans le but d’obtenir un ‘vin orange’. En plus des vinifications séparées pour chaque cépage, les raisins des génotypes cités ont été vinifiés ensemble, en ajoutant des raisins de ‘Uvarilla’ et de ‘Palumma’ aussi, pour produire un vin d’assemblage. Deux cépages locaux bien connus - ‘Bombino bianco’ et Falanghina - ont été utilisés comme témoins. Les analyses des vins ont concerné

les paramètres physiques et chimiques standards (composés aromatiques compris). Ces paramètres correspondent à ceux de vins issus d'une microvinification. Le vin de 'Malvasia Bastarda', et dans une certaine mesure celui de l'assemblage aussi, étaient plus riches en alcool (+0,8 %vol) ; les vins de 'Selvaggio' et 'Squaccianosa' avaient l'extrait sec le plus élevé. Le vin du mélange de raisins de génotypes différents, suivi de celui de 'Tuccanese Moscio' et de 'Malvasia Bastarda', était le plus riche en composés volatils, bien qu'au dessous du seuil de perception. La concentration de ces composants était généralement égale ou supérieure à celle du 'Bombino bianco' et inférieure à celle de la 'Falanghina'. A l'analyse sensorielle le vin issu de 'Selvaggio' se signalait pour la couleur plus foncée soit comme intensité soit comme teinte en lien avec une technique de vinification différente. Dans l'ensemble, le vin d'assemblage a été préféré, suivi par celui Squaccianosa, suivi à son tour par Tuccanese Moscio. Le vin d'assemblage a été le plus apprécié à cause de son arôme net et intense, ainsi que pour son harmonie, et pour sa structure, bonne aussi pour le Selvaggio. Parmi les vins d'un seul cépage, Squaccianosa et Tuccanese Moscio furent les plus appréciés et l'on considère donc ces deux génotypes comme les plus intéressants pour la production de vins blancs mono-variétaux.

Mots clés

Anciens cépages, composition du raisin et du vin, micro-vinification, composants volatils, analyse sensorielle, nouveau type de vin.

INTRODUCTION

The Northern part of the Apulia Region, that is the Foggia province (syn. Daunia), has a considerable importance within Italian viticulture since it occupies the fifth position among all the provinces producing wines and musts. This province includes three D.O.C.s, that is, San Severo, Lucera and Cerignola, and, moreover, the IGP Daunia (Protected Geographic Indication).

The growing of white-berry genotypes in this province was stimulated, during the XX century, by the winemaking industries of Northern Italy that needed neutral grapes, from "generous" varieties, to produce base-wines for vermouths. Hence, this type of winegrape growing became typical despite most of the Daunia has a semi-arid environment that, generally speaking, may favor browning reactions into white berries. Besides the "major" variety Bombino Bianco, that is the base for the "San Severo" D.O.C white wines, several "minor" white grape genotypes were introduced and "naturalized"; their grapes were added to those of the main varieties, or were blended altogether, to produce local wines. Further, as it is known, due to the germplasm simplification that characterized the agriculture of the last decades (Scarascia Mugnozza, 1974), the cultivation of many "minor" genotypes was progressively abandoned.

In 2005, a research program was undertaken at the University of Foggia, in collaboration with local farms and specialists, in order to resume, characterize and study these old varieties. Two main aims were pursued: to preserve the biodiversity, on one hand, and, on the other hand, to individuate genotypes suitable to produce new typologies of wines, joining tradition and innovation. In these years, several genotypes have been found and their general characteristics have

been described (de Palma et al., 2007; de Palma et al. 2008, de Palma et al., 2010).

In the present work, four of those genotypes have been considered to study on depth their potential quality, especially as concerns the aromatic traits of their wines. The principal traits of these genotypes, as resulting from the first study and compared with those of 'Bombino Bianco', might be resumed as follows. 'Malvasia Bastarda': high vigor and productivity joint to a good capability for sugar accumulation; 'Squaccianosa' and 'Selvaggio': from low to medium-low to vigor and grape yield, good capability for sugar accumulation, and, as concerns this latter, a high skin phenol that could be suitable to produce structured white wines; 'Tuccanese Moscio': low vigor, medium productivity and slower sugar accumulation. Mono-variety experimental wines were obtained from grapes of these genotypes. Moreover, some of their grapes were mixed to those from other two "new-old" genotypes, such as 'Palumma' and 'Uvarilla', in order to obtain a blend-wine.

The present work summarizes the main results concerning yield components, must composition, wine physical and chemical standard parameters, wine concentration of main wine volatile compounds and wine sensory evaluation. As a reference, two "major" white wine-grape cultivars were also included: 'Bombino Bianco', the main local winegrape variety, and 'Falanghina', a well-known variety that is widely grown in Southern Italian regions and that provides appreciated wines.

MATERIAL AND METHODS

This trial was carried out in the vintage 2010. At a vineyard affiliated to the "Società Cooperativa Agricola Fortore" (Torremaggiore, Foggia province, N Lat. 41°41'; E Long. 15°17'), 10 vines of the genotypes named as 'Malvasia Bastarda', 'Selvaggio', 'Squaccianosa', 'Tuccanese Moscio' and 5 vines of the genotypes named 'Palumma' and 'Uvarilla' were individuated; moreover, 10 vines of the reference varieties 'Bombino Bianco' and 'Falanghina' were also sampled. The vines were VSP trained and Guyot system pruned. The vineyard, planted in a clay-sandy soil, was more than 60-year old and was conducted according to the traditional viticultural practices typical of the growing area, as already reported (de Palma et al., 2010).

From the last week of August, 100 berries per cultivar were sampled every week in order to analyze their composition: total soluble solids (T.S.S.), titratable acidity (T.A., as tartaric acid) and pH. Aiming to obtain a sufficient alcohol degree, grapes were harvested when T.S.S. reached at least 18 °Brix; in the 2010 vintage, this threshold was reached starting from the last week of September.

Grapes of each genotype were used to realize mono-variety small-lot winemakings, except for 'Palumma' and 'Uvarilla' that, due to the low number of vines available in the vineyard, did not provide enough grapes for a separate fermentation. Thus, bunches of these two genotypes were mixed together and with some of those produced by the other genotypes obtaining a blend-wine composed as follows:

'Malvasia Bastarda' 30 %, 'Palumma' 30 %, 'Uvarilla' 23 %, 'Selvaggio' 10 %, 'Squaccianosa' 7 %.

The winemaking procedures were based on the protocol for white wines described by Savino and collaborators (2007). Since previous trials showed 'Selvaggio' grape as characterized by a high skin polyphenolic content (de Palma et al. 2010), it was chosen to produce an "orange wine" by applying a cold pre-fermentative skin maceration (at 10 °C for 24 hr); a proper protocol described by Savino and collaborators (2007) was adopted.

At wine bottling, chemical and physical parameters were assessed according to the EC 2676/90 regulation. Wines were analyzed by gas-chromatography in order to point out their aromatic traits. In particular the neutral lipophylic compounds were analyzed according to Gianotti and Di Stefano (1991). Finally, a wine sensory evaluation was done by a panel of 12 people including researchers (University of Foggia, University of Turin, CRA-Council of Research for Agriculture), enologists and experts of Società Cooperativa Agricola Fortore. Falanghina wine was "masked" to avoid the "fame effect". Using a destructured scale, the following descriptors were evaluated: visual aspect (color tonality, color intensity), aroma (purity, wine aroma, fruity, herbaceous) taste (purity, acidity, astringency, bodiness, harmony, whole judgment).

Since a very small amount of wine was realized per each individual winemaking, replications were not included in this trial.

RESULTS AND DISCUSSION

Grape harvest and yield components. In 2010, the occurring of copious rainfalls in Central and Northern Apulia, from late August to the end of the harvest period, slowed down maturation and affected the grape sanitary state. Within the present trial, bunches of 'Malvasia Bastarda' and, at a lower extent, bunches of 'Selvaggio' seemed the most sensitive to rot, while 'Falanghina' grapes were the most resistant.

'Selvaggio', 'Tuccanese Moscio' and 'Falanghina' vines produced from 3 to 4 kg per vine; 'Malvasia Bastarda' and 'Squaccianosa' gave about 7 kg of grapes per vine (table. 1). Previous studies already showed 'Malvasia Bastarda' as a very productive genotype (de Palma et al., 2010), thus the present trial confirms this habit. 'Squaccianosa', that in past years produced about 3 kg per vine, presently increased the grape yield due to a high number of cluster per vine (+40%).

Must composition. Must T.S.S. ranged from 18 to 20 °Brix (table. 2). The highest concentrations were found in 'Malvasia Bastarda' (followed by the reference cultivar Falanghina), despite its very high grape yield; previous studies pointed out 'Malvasia Bastarda' as characterized by the highest photosynthetic rate within the old varieties included in this trial (de Palma et al., 2010). The lowest must T.S.S. concentration was found in the grape blend, that was likely affected by the low refractometric degree reached by

Table 1 - Yield components.

Tableau 1 - Paramètres de rendement à la récolte.

Grapevine variety	Yield per vine (g)	Cluster per vine (n)	Cluster weight (g)
Malvasia Bastarda	7320	21.83	335.27
Selvaggio	2827	21.60	130.88
Squaccianosa	6676	28.29	266.02
Tuccanese Moscio	3747	20.67	181.30
Bombino B. (reference)	4418	19.11	231.19
Falanghina (reference)	2500	20.00	250.00

Table 2 - Main parameters of must composition.

Tableau 2 - Composition de la baie

Grapevine variety	T.S.S. (°Brix)	T.A. (g L ⁻¹)	pH
Malvasia Bastarda	20.30	5.50	3.71
Selvaggio	18.30	5.66	3.87
Squaccianosa	18.60	6.56	3.45
Tuccanese Moscio	18.50	4.80	3.68
Grape blend	18.00	4.30	3.93
Bombino B. (reference)	19.80	6.20	3.47
Falanghina (reference)	19.60	5.99	3.63

'Palumma' (~ 15 °Brix) and 'Uvarilla' (~ 17 °Brix) grapes at the time when other varieties were ready to harvest.

Must titratable acidity ranged from 4.30 g L⁻¹ (grape blend) to 6.56 g L⁻¹ ('Squaccianosa'), thus it was quite low as it often occurs in the warm climates where, due to the high air temperature, the malic acid is rapidly respired. Among the tested genotypes, a considerable higher titratable acidity was found in 'Squaccianosa' (+ 37 %) and in the reference cvs Bombino (+ 33%) and 'Falanghina' (+ 25%) respect to 'Tuccanese Moscio'. Generally speaking, a low must acidity is often related a high must pH; in this trial, must pH ranged between 3.34 ('Squaccianosa') and 3.85 (grape blend).

Wine physical and chemical parameters. All the wine physical and chemical parameters (table. 3) showed values included in a quite normal range for white wines fermented at a small scale.

Cv Malvasia Bastarda, had the highest grape T.S.S content., gave also the most alcoholic wine (12.10 % vol.). Nevertheless, the blend-wine achieved a quite high alcohol degree, although it had the lowest must T.S.S. concentration: possibly, the grape blending favoured the yeast activity by supplying a richer and more diversified pabulum. At the opposite, Selvaggio wine reached a very low alcohol degree.

Nonetheless Selvaggio wine, obtained by a cold pre-fermentative skin maceration, had the highest total dry extract, followed by Falanghina and Squaccianosa wines. Tuccanese Moscio performed at the opposite.

The volatile acidity reflected the sanitary state of grapes at harvest, hence, it was very low in Falanghina and reached the threshold 0.6 g L⁻¹ in Malvasia Bastarda.

Wine volatile compounds. Gas-chromatography analyses pointed out the presence of wine neutral lipophylic aromatic compounds deriving from fermentation: ethylic and acetate esters, higher alcohols, volatile phenols (table 4). However, according to Gianotti and Di Stefano (1991), their concentrations were all below the perception threshold.

Acetates and fatty acid ethylic esters, that are responsible for wine fruity and floral aromas, and thus have a positive influence on olfactory sensations (Lanati et al., 2010), were mostly detected in Falanghina and in the blend-wine, followed by Malvasia Bastarda and Tuccanese Moscio wines. The same was found as concerns ester-acetates such as Ethyl hexanoate (apple aroma), Ethyl octanoate (pineapple aroma), and Isoamyl acetate. Hexyl acetate and 2-Phenyl ethyl acetate (banana, pear and rose aromas) reached the highest concentrations in Falanghina and in the blend-wine. Malvasia Bastarda was the richest in Ethyl decanoate (fruity and floral aromas). The coexistence of these classes of aromatic compounds confers a particular elegance to the wines (Savino et al., 2007).

The higher alcohols, generally speaking, are known to be able to induce sharp odors and flavors when their concentration overcomes the perception threshold (~ 300 ppm); at the opposite, they may exalt the fruity aroma perception when their concentration is low (Ribereau-Gayon, 1978;

Table 3 - Wine physical and chemical parameters.
Tableau 3 - Composition des vins.

Parameters	Grapevine variety						
	Malvasia B.	Selvaggio	Squaccianosa	Tuccanese M.	Grape blend	Bombino B. (ref.)	Falanghina (ref.)
Wine density (20°C/20°C)	0.994	1.000	0.997	0.994	0.994	0.995	0.997
Alcohol density (20°C/20°C)	0.984	0.987	0.986	0.985	0.985	0.985	0.985
Alcohol (% vol)	12.10	9.42	10.80	11.37	11.62	11.09	11.05
Reducing sugars (g L ⁻¹ saccharose)	1.8	2.5	2.0	2.0	1.8	2.2	1.8
Total dry extract (g L ⁻¹)	26.6	40.0	29.2	23.5	23.5	26.1	31.0
Sugarfree extract (g L ⁻¹)	25.8	38.5	28.2	22.5	22.7	25.1	30.0
pH	3.72	3.83	3.34	3.52	3.85	3.30	3.63
Titratable acidity (g L ⁻¹ tartaric ac.)	5.30	5.57	5.93	5.37	4.74	6.14	6.34
Volatile acidity (g L ⁻¹ acetic ac.)	0.50	0.27	0.31	0.34	0.21	0.51	0.19
Total SO ₂ (mg L ⁻¹)	70	74	89	76	90	70	65

Table 4. - Wine neutral lipophylic volatile compounds.
Tableau 4 - Composants volatiles des vins

Volatile compounds (ug L ⁻¹)	Grapevine variety						
	Malvasia B.	Selvaggio	Squaccianosa	Tuccanese M.	Grape blend	Bombino B. (Ref.)	Falanghina (Ref.)
Ester-acetates							
<i>Isoamyl acetate</i>	266	172	106	139	420	97	828
<i>Ethyl hexanoate</i>	145	70	81	136	175	91	241
<i>Ethyl octanoate</i>	176	81	111	184	277	109	264
<i>Ethyl decanoate</i>	88	12	27	34	49	37	39
<i>2-Phenyl ethyl acetate</i>	103	228	103	81	391	106	408
<i>Ethyl butyrate</i>	55	40	48	73	62	50	88
<i>Hexyl acetate</i>	nd	10	nd	nd	29	nd	39
<i>Ethyl lactate</i>	nd	nd	nd	252	nd	17	nd
<i>Ethyl 3-OH-butyrate</i>	nd	8	11	16	nd	7	nd
<i>Ethyl 9-decene</i>	23	nd	8	12	24	12	21
Esters of organic acids							
<i>Isoamyl lactate</i>	nd	nd	nd	129	nd	17	nd
<i>Diethyl succinate</i>	86	162	65	2830	106	133	78
<i>Diethyl malate</i>	77	167	79	1217	96	133	64
Alcohol-Benzenoids							
<i>Hexanol</i>	446	824	322	477	461	495	567
<i>Isoamyl alcohols</i>	9594	9762	8053	14400	11078	10149	12010
<i>Trans 3-Hexenol</i>	nd	20	11	20	nd	11	13
<i>Cis 3-Hexenol</i>	nd	12	38	14	nd	18	nd
<i>Benzyl alcohol</i>	nd	23	16	80	17	23	22
<i>2-Phenylethanol</i>	9600	14345	10693	16364	16833	9900	13952
<i>4-Vinyl guaiacol</i>	32	13	139	25	36	20	19
<i>4-Ethyl phenol</i>	54	29	18	50	39	20	nd
<i>4-Vinyl phenol</i>	50	53	16	29	45	17	16
<i>1-octanol</i>	nd	9	6	20	nd	nd	nd
Terpenes							
<i>Linalool</i>	31	10	24	20	20	20	nd
<i>Endiolo</i>	nd	nd	nd	23	nd	nd	nd
Other compounds							
<i>Isoamylacetamide</i>	95	21	16	432	35	53	16
<i>1-decanol</i>	377	137	76	144	115	139	75
<i>Decanoic acid</i>	579	281	nd	384	507	380	405
<i>3-OH-β-damascone</i>	nd	nd	30	53	21	nd	28
<i>2-Phenyl ethyl acetamide</i>	nd	129	28	169	58	22	38

Lambrechts and Pretorius 2000; Swiegers and Pretorius, 2005) such as in the wines of this trial. 2-Phenylethanol, an aromatic higher alcohol recognized as one of the most important compounds for the rose odors, was detected, although at a low level, in all the wines, mainly in Tuccanese Moscio and the blend-wine, followed by Selvaggio and Falanghina.

Among compounds responsible for spicy aromas, 4-Vinyl guaiacol was considerably higher in Squaccianosa, while 4-vinilfenol was most concentrated in Selvaggio, Malvasia Bastarda and in the blend-wine.

Esters of organic acids, such as Diethyl succinate, Ethyl lactate, Isoamyl lactate and Diethyl malate, which concentrations are known to increase considerably with the wine aging, were detected in Tuccanese Moscio. Tuccanese Moscio and Selvaggio wines showed also a higher concentration of acetamides; these molecules are mainly present in wines produced by moldy grapes, that, in turn, are characterized by a very high enzymatic activity and are able to metabolize several compounds, even tannins.

Wine sensory evaluation. At the visual evaluation, Selvaggio showed the most marked color intensity and tonality (figure. 1), as expected due to its winemaking technique: during the must contact with the grape skins and their pigments, the liquid fraction was likely enriched of a light orange tinge and the wine color became darker. Among the other wines, the color intensity seemed to have been sli-

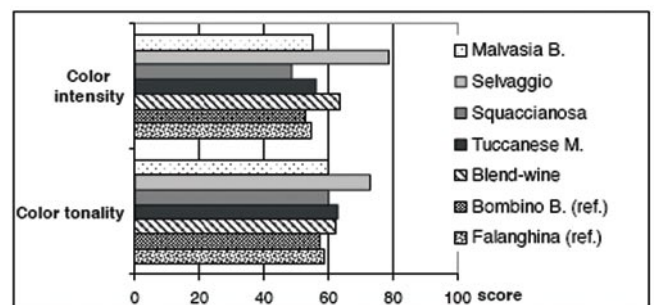


Figure 1 - Wine sensory evaluation: visual aspects.
Figure 1 - Evaluation sensorielle du vin: aspects visuels.

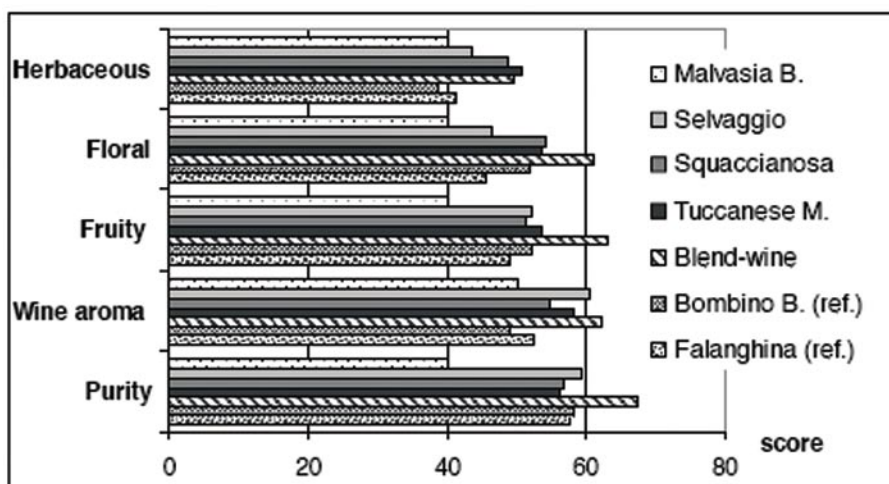


Figure 2 - Wine sensory evaluation: smell sense aspects.
 Figure 2 - Evaluation sensorielle du vin: odeur.

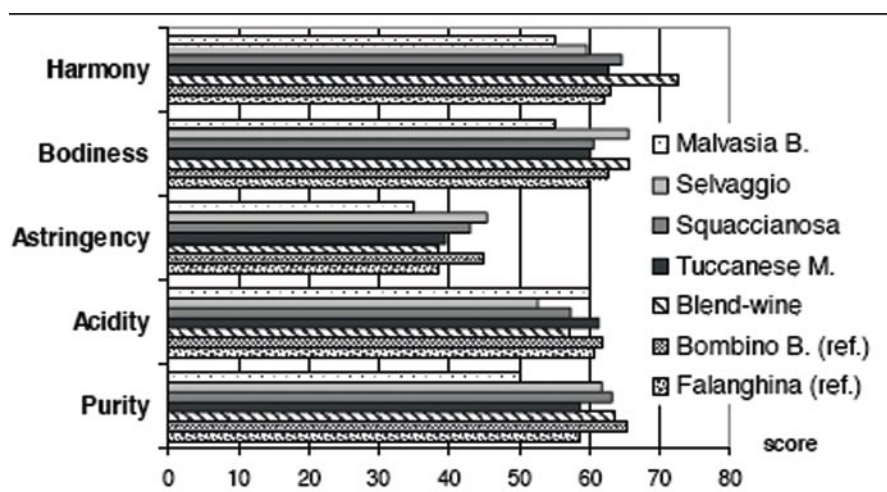


Figure 3 - Wine sensory evaluation: tasting aspects.
 Figure 3 - Evaluation sensorielle du vin: degustation.

ghtly exalted by the grape blending, while the color tonality differed very little.

At the smell sense, Tuccanese Moscio, Squaccianosa and the blend-wine had the higher score for the herbaceous aroma (figure. 2). The blend-wine showed the most marked floral aroma, followed mainly by Squaccianosa, Tuccanese Moscio and Bombino Bianco. The blend-wine received the best score also for the other descriptors, especially for purity of aroma and for fruity aroma. As for this latter descriptor, most of the other wines were found similar among them as a score, except Falanghina and Malvasia Bastarda that were tated lower. Any case, fruity and floral aromas were found more marked in all the wines obtained from the old genotypes than in Falanghina reference wine, although, according to the gas-chromatographyc analysis, it was the richest in aromatic compounds.

At the taste, the blend-wine and Selvaggio wine showed the most marked bodiness (figure. 3): Selvaggio felt the effect of its highest total dry extract and polyphenol content, both related to the winemaking technique, while the blend-wine was likely influenced by the effects of several parameters, such as a quite high total polyphenol and alcohol content

joint to a quite low acidity. Selvaggio and Bombino Bianco wines were the most astringent: previous studies showed these two genotypes as the richest in skin total polyphenols, flavonoids and proanthocyanidins (de Palma et al., 2010); moreover, as regard Selvaggio wine, the phenol extraction was likely exalted by the pre-fermentative maceration. The blend-wine was found the most harmonic, while Malvasia Bastarda performed at the opposite; among the other wines, that were quite similar among them for this tasting descriptor, Squaccianosa received a slightly higher score.

As total judgement, the blend-wine was preferred among all those tested, followed by Squaccianosa and, thereafter, by Tuccanese Moscio wine (figure. 4).

Except for Selvaggio, that had a special winemaking process, there was not a clear coherence between chemical and sensory analysis, as it sometimes happens in these kind of trials.

On the whole, the blend-wine was the most appreciated for aroma purity and intensity and, together with Selvaggio, it was rated the highest for bodiness . The blend-wine was found also the most harmonic, followed by Squaccianosa;

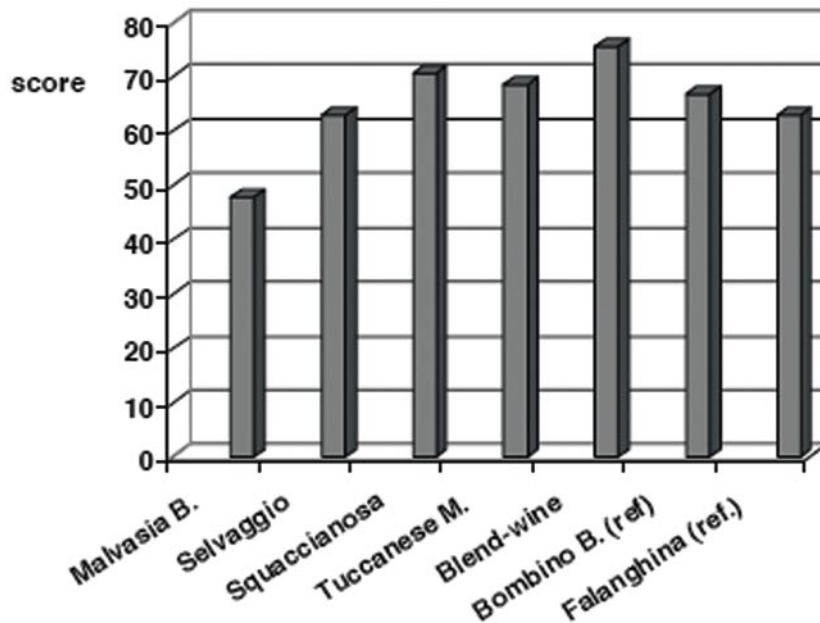


Figure 4 - Wine sensory evaluation: total judgement.
 Figure 4 - Evaluation sensorielle du vin: jugement total.

this latter did not achieve the highest score for any descriptor, but was rated quite good for most of them. The judgment on Malvasia Bastarda wine was likely penalized by the not good grape sanitary status, that on Selvaggio by the low alcoholic level. Moreover, as concerns this latter, the obtaining of orange-wine need an improvement of the small-scale wine-making technique.

CONCLUSIONS

The results of this trial encourage to pursue the obtaining of new enological products from the grapes of the “new-old” genotypes individuated in the Foggia province (Daunia), either as blend or as mono-variety wines. On the whole, the experimental wines obtained from ‘Malvasia Bastarda’, ‘Selvaggio’, ‘Squaccianosa’ and ‘Tuccanese Moscio’ showed some interesting traits that were exalted especially when the grapes were blended together and with grapes of other local genotypes, such as ‘Palumma’ and ‘Uvarilla’.

At the gas-chromatographic analysis the grape blend, ‘Tuccanese Moscio’ and ‘Malvasia Bastarda’ gave, on the whole, wines relatively richer in volatile compounds, although below the perception threshold: the concentrations of these chemical compounds were found generally similar or higher than in Bombino Bianco and lower than in Falanghina.

Surprisingly, Falanghina wine was not preferred to the other genotypes at the sensory evaluation, in spite of the results of chemical analyses and of its fame. Since all grapes and wines were obtained using the same protocol, it might be supposed that the “new-old” genotypes had a potential sensory characteristics at least not worst than those of ‘Falanghina’. Nonetheless, a longer study is necessary to corroborate these results.

The grape blend gave wine that was preferred at the sensory test; in particular, it resulted the most harmonic as it

occurs when there is a good sense of balance among the characteristics of different grape varieties. Nevertheless, ‘Squaccianosa’ and ‘Tuccanese Moscio’ were the most appreciated as mono-variety white wines. However, further trials are necessary to confirm these results.

LITERATURE

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