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preliminary communication

Evaluation of the Enological Suitability of Some Strains of *Saccharomyces cerevisiae* for Sauvignon Blanc

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Summary

Recent research has demonstrated the significant effect of the yeast strain in the aromatic expression of Sauvignon Blanc. In order to evaluate some commercially available strains of Saccharomyces cerevisiae and some recently selected strains with particular enological characteristics, including different hydrogen sulphide production levels, fermentation trials were performed with Sauvignon Blanc must which had been clarified by flotation to a turbidity value of 100 NTU.

The fermentative ability was evaluated by the determination of the concentration of reducing sugars during fermentation, and the aromatic characteristics of the resulting wines were analysed chemically and by sensory tests. In addition, the karyotypes of the Saccharomyces cerevisiae strains used were determined.

All the yeasts tested completed the alcoholic fermentation but did so at different fermentation speeds; in particular, the D13 selection finished the fermentation very rapidly, while the strains Uvaferm CM, 71B and BF18 had slower kinetics.

Through discriminant analysis applied to the 3 groups deriving from cluster analysis of aromatic compounds, the relative weight of the aromatic compounds has been determined in differentiating the groups, the most important compounds are 3-(2-hydroxyethyl)-indole, isoamyl alcohols (2-methyl-1-butanol and 3-methyl-1-butanol), butanoic acid ethyl ester, n-caproic acid and other minor compounds. These compounds are also amongst the most important in discriminating other types of wine under the aromatic profile and it is therefore desirable that this topic be examined more closely.

At the end of the fermentation, the products were subjected to a first round of sensorial analysis involving preference tests to identify the possibility of differences between the yeasts in terms of presence of aromatic compounds. These tests allowed the identification of two yeasts, namely P4 and R2, which had the typically intense and persistent aroma of Sauvignon Blanc, while all the others, although not being organoleptically defective, yielded a product which was fairly neutral and anonymous. No difference was observed when comparing karyotype of the Saccharomyces cerevisiae strains tested.

Keywords: Sauvignon Blanc, yeast, flavour, enological characteristics, *Sacch. cerevisiae*

Introduction

The principal characteristics and originality of the Sauvignon wines resides in their typical varietal aroma which is usually intense, from the herb and fruit notes, which tasters define as being reminiscent of green pepper, asparagus and tomato leaves; this aroma can be attributed to the compounds in the alkylmethoxypyrazine group, in particular 3-isobutyl-2-methoxy-pyrazine which is almost always dominant from a quantitative point of view *(1–3)*. The other aromatic note encountered in the Sauvignon wine, which is evocative of blackcurrants, boxwood, cat's pee, appears to be due to a compound with thiolic function, 4-mercapto-4-methylpentane-2-one *(4)*. Other tones with a »fruit« character such as the scent of grapefruit, passion flower or exotic fruits, are attrib-

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utable to odorous components which are not yet well-identified and are still the object of research. However, recent research would indicate that the acetate of 3-mercaptoethanol may be responsible for these aromatic fruit notes *(5)*.

There is a wealth of scientific documentation on the hundreds of volatile compounds which originate from the fermentative metabolism of the yeasts and are responsible not only for the aroma of the wines, but also to a certain extent for the flavour, in forms and ways that have yet to be explained, due to the objective complexity deriving from the high number of compounds, the concentrations of which are often extremely low and the reciprocal interactions, which are very difficult to identify.

The quality of a product does not so much depend upon the primary metabolism of the yeast as on the so-called »secondary« metabolism and all those variations in the medium resulting from the permanency of the yeast itself; it seems evident that the equilibrium between the myriad metabolites is extremely delicate but fundamental. Many of these metabolites are found in concentrations that are at the limit of detection or even below it, as may be the case with some sulphurous compounds; the concentrations can vary from the order of nanograms to a few grams per litre. As may be imagined, this equilibrium is very easily influenced by even the smallest variation in the composition of the base medium.

Numerous factors have been pointed out, which allow the production of positive organoleptic metabolites. The main technological factors are characteristics of the grape, vinification techniques, control of the fermentation conditions (temperature, aeration), cleanliness of the musts, use of adjuvants, conservation; the chemical-physical and metabolic factors are composition of the must, thiamine, nitrogenous feeding, pH, selection of suitable yeast stock.

Knowledge of the genetic tendencies of the yeast is particularly important, not only with regard to traditional parameters, fermentation speed and alcoholigenic power, but especially with regard to production capacity for SO_2 and H_2S and cellular esteratic activity.

It has been demonstrated that the same yeast, used to ferment media of identical composition, produces a high variability in the production of volatile compounds *(6,7)*, even if this is statistically lower than that derived from modifications in the state of the medium, such as, for example, temperature *(8)*.

With regard to Sauvignon wine, it has been established that, starting with the same variety of grape juice and fermenting it with different yeast stocks, the wines obtained present quite definite aromatic Sauvignon tones.

In particular, Darriet and collaborators *(9)* have pointed out that the perception of mercaptopentanone, and therefore the concentration of this substance, varies significantly according to the yeast stock which has performed the fermentation of a Sauvignon must. The development in intensity of this substance has been assessed during alcoholic fermentation of a Sauvignon must in the laboratory, with combined gas chromatographic and olfactometric methods. A diverse mercaptopentanone content has been observed in the musts, depending upon the type of yeast utilised; this compound is absent in the aromagrams of non-fermented must, as is also an odorous zone characteristic of the Sauvignon wines.

Another experiment has reinforced the hypothesis of the S-conjugate compound of cysteine as the precursor of mercaptopentanone in the grape; stocks of type EG8 and VL3C were used, which best characterize the aroma of Sauvignon in fermentation, put into must containing a certain quantity of S-conjugate of cysteine (a possible precursor of mercaptopentanone). These stocks release equally large quantities of mercaptopentanone into the medium during fermentation. This reinforces the hypothesis of a structural analogy between this compound and the precursor of mercaptopentanone in grapes, and allows one to assume that detection of the Sauvignon aroma results from an enzymatic activity of the yeast of the carbon sulphur lyase type *(10–12)*.

Considering the importance of the yeast in the aromatic expression of the vines, with the current experiments the intent has been to verify the influence of the yeast stocks currently on the market and those being developed, on the aromatic performances of Sauvignon Blanc.

Materials and Methods

The test was carried out at the »Viticoltori Friulani la Delizia« cellar in Casarsa, using a Sauvignon blanc must as a base which had been clarified by flotation and inoculated with thirteen different yeast stocks, described as follows:

a) Active dry yeasts
- CY 3079 selected by the Bureau Interprofessionnel des Vins de Bourgogne;
- Uvaferm CM selected by Montrachet, 522 Davis (University of California);
- EG 8 isolated and selected by INRA Alsace;
- 71 B selected by INRA Narbonne;
- VL 1 selected by the Institute of Enology of Bordeaux;
- VL 3 selected by the Institute of Enology of Bordeaux;
- R 2 produced by Lallemand, Denmark;
- Aromatik K produced by Lallemand, Canada.

b) Cultured yeasts
- BF 18, C 5, B 8, D 13 and P 4 selected in Friuli.

Preparation of the fermentation tests

Active dry yeasts and yeasts in agar suspension were used.

To the synthetic must water soluble compounds were added: 100 g/L sugar (50% glucose and 50% fructose), 30 g/hL diammoniumphosphate, and 60 mg/hL thiamine. The synthetic must in full fermentation thus obtained was added to a volume ten times greater of sterilised must. This operation was repeated three times until 10 L of must in full fermentation was obtained. The mass thus obtained was added to Sauvignon Blanc must which had been clarified using the non-oxidising flota-

tion technique, in the amount of 10 L (5% vol. of the mass) in order to obtain a population of 2×10^6 cells/mL. Thirteen containers of 200 L each were used, and at the start of fermentation 6.9 L Rectified Concentrated Must were added in order to develop an alcoholic level of 11.5% vol.

The fermentation was performed at room temperature; it was also monitored daily by determining sugar consumption and alcohol development.

Analytical methodologies

Titratable acidity, reducing sugars, free and total sulphur dioxide, and ethanol were determined according to the methods reported in the GUCE *(13)*.

Higher alcohols

A VARIAN gas chromatograph, model 3700 was used, with FID detector, connected to a VARIAN 4290 integrator. Methanol, n-propanol, isobutanol, 2-methyl-1-butanol, 3-methyl-1-butanol, 3-methyl-1-pentanol, 1-hexanol and ethanol were separated using a SUPELCO Carbopack F-SL glass wrapped column (2 × 2 mm i.d.). The operational conditions were as follows: initial temperature of the column: 80 °C for 4 minutes, then programmed at 10 °C/minute up to 170 °C and maintenance of the temperature for 10 minutes, temperature of the injector and detector: 170 °C, nitrogen gas transport with a flow of 20 mL/min. 0.5 µL dense sample was injected into an identical solution of wine and a standard control (ter-butanol) at a concentration of 0.0262 g/L.

Aromatic fraction

Preparation of the sample: an extraction was performed in the solid phase of the aromas using ISOLUTE SPE COLUMNS C18 (EC) cartridges, activated with methanol and conditioned with tartaric buffer at 2 g/L and 5° alcohol. The extract was performed on 20 mL of sample, before centrifuging, with the addition of 20 mL water and 100 µL standard control (solution of 3,988 g/L dodecanol in ethanol). A flushing was performed with 10 mL water. The elution of the aromas held back from the extracting phase was performed using 5 mL pentane/dichloromethane (2:1) in two successive phases; the eluate was then completely recovered by aspiration with a no-load pump and concentrated in a nitrogen current.

Analytical instrumentation and operational parameters: the qualitative analysis of the aromas was performed using a VARIAN gas chromatograph, model 3400, connected to a VARIAN Saturn ion-trap spectrometer (ITDMS). Separation of the analytes took place in a J & W DB-1701 capillary column of fused silica 30 m in length, with an internal diameter of 0.25 mm and film thickness in the stationary phase of 0.25 µm. The transport gas was helium with a linear speed of 40 cm/second. The analysis was carried out with the following temperature program: initial temperature of 60 °C maintained for 1 minute, gradient of 4 °C/min. up to a temperature of 250 °C, with a final isotherm of 20 minutes. The injector was maintained at 280 °C and the injection was performed in 1/20 splitter. The transfer line temperature was maintained at 250 °C, the manifold at 170 °C. The filament current was fixed at 10 µA, and the ionization energy at 70 eV. The quantitative analysis required the use of a Carlo Erba MEGA 2 8560 gas chromatograph, in the same operational conditions as described above, with the FID detector temperature at 280 °C.

The aromatic compounds evaluated are: acetic acid ethyl ester, *n*-capric acid, phenyl acetic acid amide, tetradecanoic acid methyl ester, palmitic acid ethyl ester, 3-(2-hydroxyethyl)indole, oleic acid ethyl ester, linoleic acid ethyl ester,acetic acid hexyl ester, 3-methylthio-1-propanol, *n*-caproic acid, 1-methyl-2-pyrrolidinone, octanoic acid ethyl ester, 2-phenylethanol, succinic acid diethyl ester, *n*-caprylic acid, N-(3-methylbutyl acetic acid amide, acetic acid phenylethyl ester, decanoic acid ethyl ester, butanoic acid ethyl ester, isoamylacetate, *cis*-3-hexen-1-ol, *trans*-3-hexen-1-ol, 2-methyl-1-butanoic acid, 3-methyl-1-butanoic acid, hexanoic acid ethyl ester.

Analysis of the karyotype (14)

A CHEF DR-II electrophoretic device (pulsed field electrophoresis system-Biorad) was used to study the karyotype.

Method for preparing the agarose plugs.

1) Growth of the yeast cells to Y.P.D. at 30 °C for 36–48 hours.
2) The cells are recovered by centrifuging at 4 °C for 10 minutes at 3000 r.p.m.
3) The supernantant is eliminated and the cells are re-suspended in EDTA 0.05 M at pH = 8 in a ratio of 3 volumes of EDTA to 2 volumes of cells.
4) A solution containing Lyticase (Sigma) (2 mg/mL in NaHPO4 0.01 M with 50% of glycerol) is added to the cellular suspension in a ratio of 3:1.
5) Incubation at 37 °C for 20 minutes.
6) 0.3 mL of the cellular suspension are taken and added to 0.9 mL of agarose at 1% (Low Melt Preparative Grade Agarose Biorad in 0.125 M of EDTA, pH = 7.5) at 50 °C and left to gel in a suitable mould for 20 minutes.
7) The plugs obtained are immersed in LET buffer (EDTA 0.9 M, pH = 8, Tris 0.02 M, pH = 7.5 and 2-mercaptoethanol 7.5%) and maintained for 16–24 hours at 37 °C.
8) After three flushings with EDTA 0.05 M, pH = 8, the agarose plugs are immersed in a 1 mg/mL solution of Proteinase K (Sigma) in NDS buffer (EDTA 0.9 M, pH = 8, Tris 0.02 M, pH = 7.5, 1% lauryl saccharose) and incubated at 50 °C for 12–24 hours.
9) Three flushings are performed with EDTA 0.05 M, pH = 8, successively, the plugs are left 16–24 hours at room temperature.

At the end of this preparation, the plugs can be conserved for 12 months in 0.05 M of EDTA, pH = 8 at 4 °C or they can immediately be subjected to an electrophoretic process.

The plugs were subjected to an electrophoretic process in gel (1%) Chromosomal Grade Agarose (Biorad) in 0.5 TBE (45 mM Tris, 45 mM boric acid, 1 mM of EDTA). The *Sacch. cerevisiae* YNN 295 vinestock (BIORAD) was used as a reference standard.

Process parameters: initial switch of 60 seconds, final switch of 120 seconds, process time of 22 hours, constant amperage of 150 mA.

At the end of the process, the gel was colored with a solution of 0.5 mg/L Etidio-bromide and photographed under a UV transilluminator.

The photograph was taken with a Polaroid camera.

Sensory analysis

As we were dealing with applied technology trials, in the preference test *(15)* the tasters were asked to classify the samples in order of preference using the typical Sauvignon aroma as a standard.

Statistical methods

The statistical package used was Statistics/W of Stat. Soft. inc., 1993. The cluster and discriminant analyses were applied as descriptive methodologies. The cluster analysis involved the application of Ward's method without any groups being assigned *a priori*, while the discriminant analysis used the mahalanobis distance method on the groups derived from the cluster analysis, with an entry F value of 0.05 and a remove F value of 0.00.

Results and Discussion

The fermentation tests were carried out at the »Viticoltori Friulani La Delizia« cellar in Casarsa and involved the inoculation of masses of must of 2 hL with previously re-activated yeasts. The fermentation took place in inox steel tanks and information was collected during this period on the operation of fermentation by each yeast. The results obtained are shown in Fig. 1 and Table 1. The original must had a sugar gradation of 16.57° Brix, and on the second day of fermentation 6.9 L of M.C.R. were added to take the wine to a total alcohol of 11.5% vol.

The macrocompositive analyses performed on the wines at the end of fermentation indicate that there were no anomalous fermentations, as no high values of volatile acidity were found. There were no variations in titratable acidity and this leads to the hypothesis that any demalicant activity was performed by the different yeasts in equal measure. No differences were found in the production of sulphur dioxide. The pH value remained unchanged and this lead to the assumption that there were no malolactic fermentations.

All the yeasts managed to consume the sugars, there were no signs of difficult fermentations, nor of suspension of fermentation. In particular, the yeasts UV.CM, BF 18 and 71 B brought the fermentation to conclusion more slowly and gradually, whilst the others had already consumed most of the sugar at the end of the second day. The yeast stocks which performed a fermentation with a high production of foam proved to be R 2, BF 18, ARO K and CY 3079. The production of foam was observed on the second and third day of fermentation and then it gradually abated, disappearing by the time fermentation was completed.

From observing the fermentative trend, no significant parameter emerged which would discriminate one yeast from another, and further analytical studies of the wine are thus necessary in order to identify yeasts with superior characteristics.

A study of the genome of the tested stocks was also carried out, using the technique of electrophoresis in a pulsed field. From the patterns of the strips obtained, visible in photos 1 (Fig. 2) and 2 (Fig. 3), the molecular weights may be observed, between 220 and 2200 Kpb corresponding to 16 typical chromosomes of *Saccharomyces cerevisiae*. This has allowed the observation that no phenomena of polymorphism are present, the profiles appear similar amongst themselves, illustrating that the profiles of the stocks »on the market« prove similar to the »non-commercial« stocks.

At the end of fermentation a sensorial assessment was performed in order to indicate solely the typicality of the product obtained; the results obtained can be seen in Fig. 4, where the wines have been divided into 3 groups: very typical, averagely typical, non-typical. The grouping has resulted from the three preference groups, with regard to the aromatic aspect, in as much as it was noted that two of the stocks tested proved to be typical

Table 1. Macrocompositive analysis of wine obtained from different strains

Strain	Alcohol φ/%	Free sulphur dioxide $\gamma/(mgL^{-1})$	Total sulphur dioxide $\gamma/(mgL^{-1})$	Titratable acidity $\gamma/(mgL^{-1})$	pH	Volatile acidity $\gamma/(mgL^{-1})$
UV.CM	11.60	12	44	5.2	3.60	0.18
R2	11.57	12	48	5.3	3.64	0.20
71 B	11.55	12	40	5.4	3.66	0.21
P 4	11.56	12	40	5.2	3.55	0.21
K	11.60	12	48	5.2	3.58	0.18
VL 3	11.32	14	46	5.4	3.60	0.18
CY 3079	11.60	18	44	5.1	3.57	0.20
EG 8	11.44	12	40	5.2	3.63	0.15
VL 1	11.44	14	48	5.4	3.58	0.18
BF 18	11.56	10	45	5.2	3.57	0.18
B 8	11.50	14	58	5.1	3.57	0.22
C 5	11.24	14	32	5.4	3.58	0.24
D 13	11.54	16	40	5.3	3.58	0.18
Must before fermentation	0	20	50	9	3.55	0

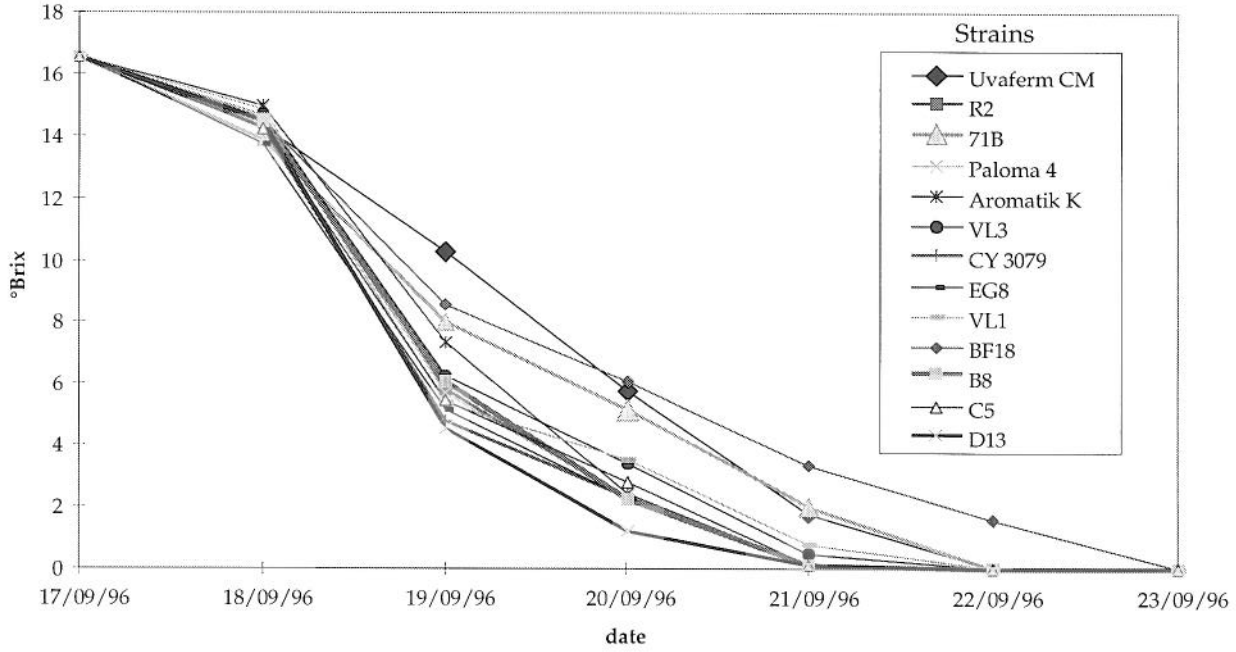

Fig. 1. Fermentation trends of different *Saccharomyces cerevisiae* tested

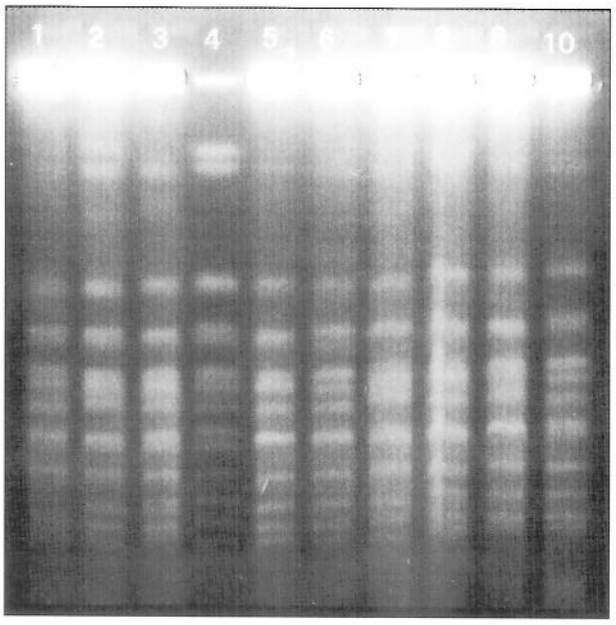

Fig. 2. (Photo 1). Chromosomal profiles in pulsed field electrophoresis (system CHEF) of *Saccharomyces cerevisiae*:
Lanes: 1. EG8 commercial yeast, not used in this study; 2. VL1 commercial yeast, BF18; 3. VL3 commercial yeast, D13; 4. Standard marker strain YNN295 (Bio-Rad), not used in this study; 5. Paloma 4 commercial yeast, standard YNN295; 6. R2 commercial yeast; 7. C5 yeast isolated from Friuli region,UVA FERM CM; 8. CY 3079 commercial yeast, B8; 9. Aromatik K commercial yeast, not used in this study; 10. 71B commercial yeast, not used in this study

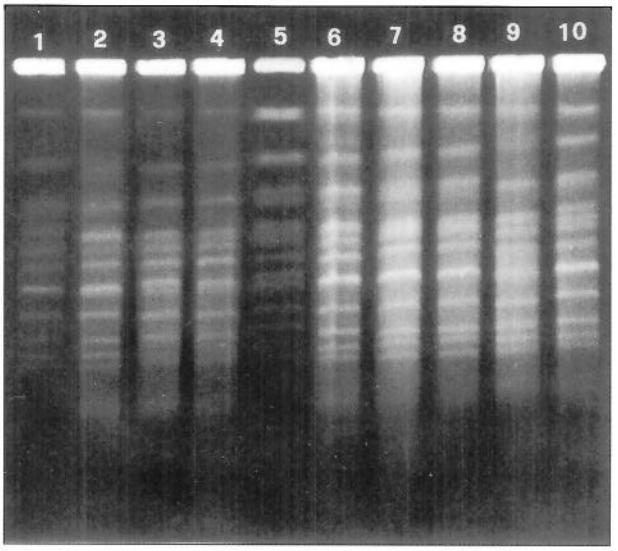

Fig. 3. (Photo 2). Chromosomal profiles in pulsed field electrophoresis (system CHEF) of *Saccharomyces cerevisiae*:
Lanes: 1. EG8, not utilized in this study; 2. BF18 yeast isolated from Friuli region,VL1; 3. D13 yeast isolated from Friuli region, VL3; 4. Standard YNN295, not utilized in this study; 5. Standard marker strain YNN295 (Bio-Rad), Paloma 4; 6. R2 commercial yeast; 7. Uvaferm CM commercial yeast, C5; 8. B8 yeast isolated from Friuli region CY 3079; 9. ARK, not utilized in this study; 10. 71B, not utilized in this study

in sensorial analysis. This assessment has not taken into account personal appreciation of the product.

Analyses characterizing the aromatic profile of the wines were subsequently performed.

In addition, a further elaboration was carried out by grouping analysis (Fig. 5); in the elaboration 3 groups emerge related to the aromatic constituent and in particular it may be noted that yeasts P4 and R2, which proved to be the most typical in the tasting phase, are in adjacent position. Considering that the typicality should be defined by methoxypyrazine and mercaptopentanone content *(4,5,9,16–19)* this subdivision becomes interesting, as the above-mentioned compounds

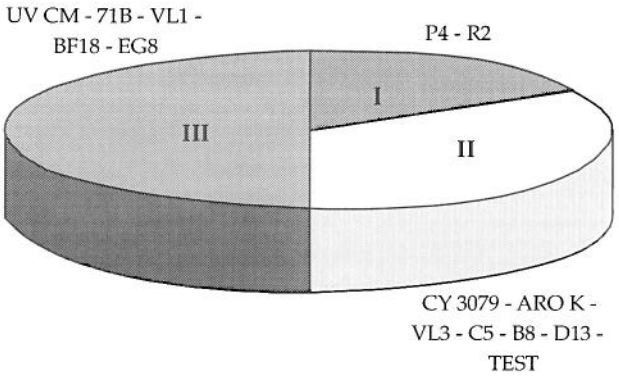

Fig. 4. Results of the sensory analysis applied to wines at the end of fermentation
Legend: I = typical product, II = averagely typical product, III = non typical product

Tab. 2. Standardized coefficients of first discriminant function

Analytical parameters	Coefficients (99% var. expl.)
n-caproic acid	–13,52
1-hexanol	–4,93
acetic acid hexyl ester	–0,81
butanoic acid ethyl ester	–19,36
octanoic acid ethyl ester	–0,26
3-(2-hydroxyethyl)indole	–31,50
Isoamylic alcohols (2-methyl-1-butanol and 3-methyl-1-butanol)	20,64
1-propanol	8,63
trans-3-hexen-1-ol	–0,49
Unknown compound	8,30

are not amongst those determined. It may, therefore, be assumed that typicality is due to a complex of substances which participate in the flavour of the wine and, in addition, other compounds that emerge as important tracers of metabolic paths in the aromatic picture. However, the importance of the yeast stock is also emphasized in the formation of typical aromas of a wine. Through discriminant analysis applied to the 3 groups deriving from cluster analysis, the relative weight of the aromatic compounds has been determined in differentiating the groups (Table 2). It may be observed that the most important compounds are 3-(2-hydroxyethyl) indole, isoamyl alcohols (2-methyl-1-butanol and 3-methyl-1-butanol, butanoic acid ethyl ester, *n*-caproic acid and other minor compounds. It is interesting to note that these compounds are also amongst the most important in discriminating other types of wine under the aromatic profile and it is therefore desirable that this topic be examined more closely.

Looking at the substances which, through discriminant analysis, have proved to be more important in comparing the relevant groups in cluster analysis, one may make different observations. With regard to the compound 3-(2-hydroxyethyl)-indole, its formation path is not known *(20)*, and it is not very clear if this compound acts as tracer for other metabolic paths which in turn lead to compounds of aromatic interest. With regard to butanoic acid ethyl ester, octanoic acid ethyl ester and *n*-caproic acid, these are compounds which, taken individually, do not manifest pleasant aromas, but as part of the whole wine, contribute to the structure of the aroma *(20–22)*. The effects of these substances on the metabolism of the yeasts are known, in as much as, if they are present in high concentrations, they alter the mechanisms of exchange between the interior and exterior of the cell, thus inhibiting the normal course of fermentation. In this regard, it needs to be recalled that the substances which are used as activators of fermentation, such as crystalline cellulose and yeast skins, adsorb these compounds. If it is true that these contribute fundamentally to the overall aroma of the wine, then it is necessary to consider the problem of when to use adjuvants.

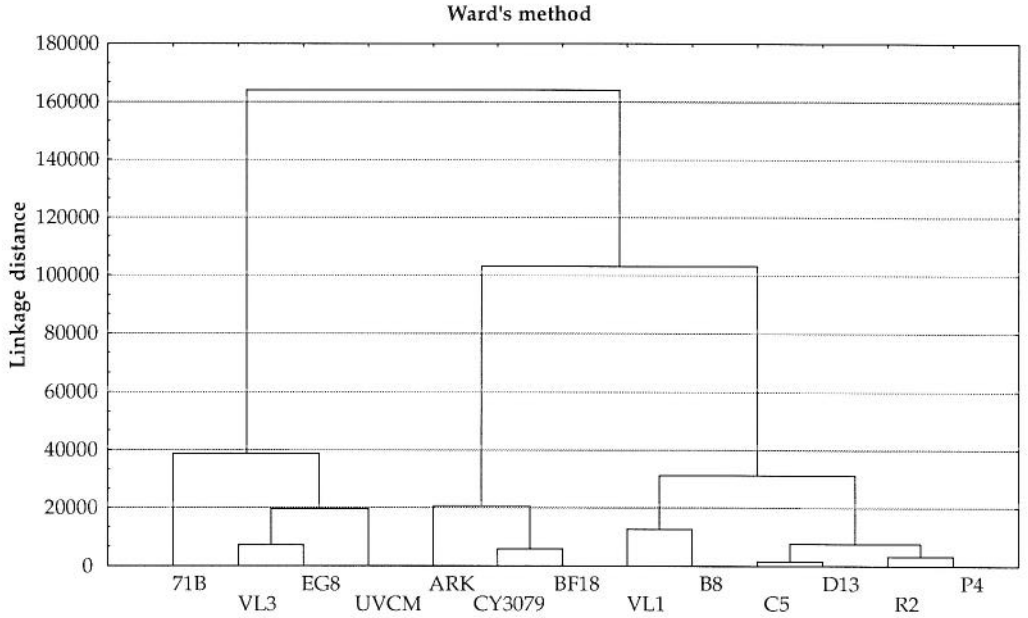

Fig. 5. Cluster analysis applied to the volatile compounds

Our case is far from having high concentrations of fatty acids, but it may be said that they are important under the aromatic profile because as a whole they give structure to the aroma; thus lower quantities would lead to dull aromas and to more unpleasant aromas, such as, for example, »sweat« and »soap«. Substances such as 1-hexanol and *trans*-3-hexen-1-ol form part of the metabolism of the lipidic fraction; they derive essentially from pre-fermentative aromas, such as compounds of reduction of the aldehydes originating in the pressing phase; these are found in all the ferments *(23–25)*.

As the concentration of the precursors of these compounds is the same, it can be assumed that the different quantities of C_6 compounds found in the wines tested may be connected to the diverse fermentative activity. A high fermentation speed can cause a loss of the more volatile aldehydes due to stripping or else a premature reduction of the aldehydes present. The *n*-propanol is of aminoacidic origin, and the fact that it is discriminant in distinguishing the different stocks in these tests may lead to consideration of the different preference of nitrogenous substratum by the yeasts themselves.

With regard to isoamyl alcohols, which are also derived from the nitrogenous metabolism of the yeasts, in low concentrations they give body to the aroma of the wine, whilst in higher concentrations they remove freshness and give characteristics of »phlegm oil«, thus making the aroma heavy and oily, especially in white wines *(26)*.

The considerations explained above require further research and confirmation, as so far the typicality of the Sauvignon Blanc aroma has not been clearly defined.

Conclusions

From the observation of the fermentative trend, it may be noted that some yeasts present a slower fermentation speed, but in all cases all the sugars are fermented. From the sensorial analysis, it may be noted that two of the thirteen yeasts intensified the typical aromas of Sauvignon Blanc.

From the chemical analysis of the volatile fractions, it may be seen that the yeasts are divided into three groups because of some aromatic substances. However, the importance of the yeast stock is also emphasized in the formation of typical aromas of a wine. Through discriminant analysis applied to the 3 groups deriving from cluster analysis, the relative weight of the aromatic compounds has been determined in differentiating the groups. It may be observed that the most important compounds are 3-(2-hydroxyethyl)-indole, isoamyl alcohols (2-methyl-1-butanol and 3-methyl-1-butanol, butanoic acid ethyl ester, *n*-caproic acid and other minor compounds. It is interesting to note that these compounds are also amongst the most important in discriminating other types of wine under the aromatic profile and it is therefore desirable that this topic be examined more closely. Analysis of the karyotype shows no differences, so according to first preliminary study no correlation exists between phenotypic characteristics and yeast geneses.

These considerations require further research and confirmation, as so far the typicality of the aroma of Sauvignon Blanc has not been clearly defined.

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Procjena enološke podobnosti nekih sojeva *Sacharomyces cerevisiae* za proizvodnju Sauvignon blanc

Sažetak

Nedavna istraživanja upućuju na značajan utjecaj soja kvasca na aromatske sastojke u Sauvignon blanc. Kako bismo procijenili komercijalno dostupne sojeve Sacch. cerevisiae i nedavno odabrane sojeve s posebnim enološkim značajkama, uključujući različitu količinu proizvedenog vodikova sulfida, provedeni su pokusi s moštom Sauvignon blanc koji je bio bistren flotacijom do vrijednosti zamućenja od 100 NTU.

Sposobnost fermentacije procijenjena je određivanjem koncentracije reduciranih šećera tijekom vrenja, a kemijski i organoleptički analizirane su aromatske osobine dobivenih vina. Ujedno su utvrđeni kariotipovi sojeva Sacch. cerevisiae.

Svi ispitivani kvasci završavali su alkoholnu fermentaciju, i to različitom brzinom. D13 završavao je fermentaciju vrlo brzo, dok su sojevi Uvaferm CM,71B i BF18 bili polaganiji. Diskriminacijskom analizom, primijenjenom na tri skupine dobivene skupnom analizom aromatskih spojeva, utvrđena je relativna masa aromatskih spojeva diferencijacijom skupina u kojima su najvažniji spojevi 3-(2-hidroksietil)-indol, izoamilni alkoholi (2-metil-1-butanol i 3-metil-1-butanol), etilni ester maslačne kiseline, n-kapronska kiselina i drugi manji sastojci. Ti su spojevi među najvažnijima i po njima se mogu razlikovati tipovi vina (prema udjelu aromatskih sastojaka) pa ih je stoga potrebno podrobnije istražiti. Na kraju fermentacije vina su bila organoleptički ispitana uključujući referentne testove za identifikaciju mogućih razlika među kvascima, a prema prisutnosti aromatskih spojeva. Testovima su utvrđena dva kvasca, P4 i R2, koji su davali tipičan intenzivan i postojan miris Sauvignon blanc. Ostali su, iako ne organoleptički loši, davali proizvod koji je bio skoro neutralan i bezličan. Uspoređujući kariotipove ispitivanih sojeva Sacch. cerevisiae nije opažena nikakva razlika.