SELECTED AUTOCHTONOUS YEAST STRAINS WITH INFLUENCE ON WINE QUALITY

TULPINI DE DROJDII AUTOHTONE SELECȚIONATE CU IMPACT ASUPRA CALITĂȚII VINURILOR

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Abstract. *The aim of this work was to study the influence of some autochthonous yeast strains on the wines quality. For this purpose grape must from the Cabernet Sauvignon grapes, during 2 harvest years (2009 - 2010), was used. The selected autochthonous yeast strains are part from the microbiota collection created at the Research Institute for Viticulture and Enology, Valea Calugãreascã, during 2007 – 2009 period. The strains were isolated from the vineyard, from the grapes surface and during different phases of alcoholic fermentation and were identified as belonging to Saccharomyces genus. The selection of yeast strains was performed after metabolic evaluation (period of latency, fermentation kinetics, features of fermented mash, tolerance to alcohol, fermentation temperature), and oenological evaluation (compositional profile, sensory profile). From a total of 30 wine yeast strains, three strains (SC 46, SC 62 and SC 23) have been kept for the production of wines with improved varietal characteristics. SC 58 strain is destinated for the production of qualitative dried red wine. Because of alcohol resistance (up to 17.5% vol) the strain can be used, also, to restart the alcoholic fermentation*.
Key words: yeast, *Saccharomyces*, fermentation, wine

Rezumat. *Acest studiu a avut drept scop analiza influenței unor tulpini de drojdii autohtone asupra calitații vinurilor. Experimentările au fost efectuate timp de 2 ani consecutiv (2009 -2010), utilizându-se mustul obținut din struguri aparținând soiului Cabernet Sauvignon. Tulpinile de drojdii selecționate provin din colecția de microorganisme inființată la Institutul de Cercetare-Dezvoltare pentru Viticultura si Vinificație, Valea Calugãreascã, în perioada 2007 – 2009. Tulpinile au fost izolate de pe struguri şi în diferite faze ale fermentației alcoolice, şi au fost identificate ca aparținand genului Saccharomyces. Selecția tulpinilor de drojdii a fost bazată pe evaluarea caracteristicilor metabolice (perioada de latență, cinetica de fermentare, particularitațile mustului fermentat, toleranța la alcool, temperatura de fermentare), şi a celor oenologice (profil compozițional, profil senzorial). Din 30 de tulpini analizate, 3 tulpini (SC 46, SC 62 si SC 23) au fost selecționate pentru a fi utilizate în producerea vinurilor cu caractere varietale intensificate. Tulpina SC 58 este recomandată pentru obținerea vinurilor roşii de calitate. Datorită rezistenței la alcool (până la 17,5% vol) tulpina poate fi utilizată şi pentru a reporni fermentația alcoolică.*
Cuvinte cheie: drojdie, *Saccharomyces*, fermentație, vin

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INTRODUCTION

The use of selected *Saccharomyces* yeasts for alcoholic fermentation in winemaking is essential for the continous improvement of the wines quality and for food safety assurance. In order to ovoid the risks of the must spontaneous fermentations, active dried yeast cultures are used. The wine is made in a integrated system, with a better control of alcoholic fermentation under inputs reducing. The final product is of a better quality than the wine produced by traditional spontaneous fermentation (Fleet and Heard, 1993, Giudici and Zambonelli, 1992, Regodón et al., 1997, Ribéreau-Gayon P., 1985).

In the last two decades, a interest has grown in using new autochthonous or local selected yeasts to control must fermentations. These yeasts are better acclimited to the local environmental conditions and can enhance the typical sensory properties of the wines produced in a given region (Degre, 1993; Maqueda, 2011).

The aim of this work was to study the influence of some autochthonous yeast strains isolated from Dealu Mare vineyards, Valea Calugareascã center to the wine quality.

MATERIAL SI METHOD

The isolation and selection of yeasts were performed in the 2007-2009 period in the Dealu Mare vineyard, Valea Calugareascã center and were identified as belonging to *Saccharomyces* genus. From a total of 30 wine yeast strains tested 2 consecutive years (2009 – 2010), four strains (*SC* 46, *SC* 62; *SC* 58 and *SC* 23) have been kept for the production of wines with improved varietal characteristics.

The selection of yeast strains was performed after metabolic evaluation (period of latency, fermentation kinetics, features of fermented mash, tolerance to alcohol, fermentation temperature), and oenological evaluation (compositional profile, sensory profile).

The physicochemical analyses were performed in order to establish the basic composition (alcoholic strength, total acidity, volatile acidity, reducing sugar, total dry extract), the polyphenolic composition (Folin-Ciocalteu index, anthocyanins,) and the chromatic characteristics (Color intensity, hue).

Conventional oenological parameters of wines were determined in accordance with official International Organization of Vine and Wine (OIV) practices (Recueil International des Methodes d'Analyses).

Organoleptic analysis of the wines was performed using the sensory descriptive method by a panel of winetasters trained for this activity.

The sensory descriptors were evaluated by points awarded on a scale from 1 to 5 and then recorded in a special descriptive evaluation sheet. On the basis of the obtained results, the composition and the sensory profiles for each wine were realized.

RESULTS AND DISCUSSION

The origin of the selected yeast strains is included in table 1.

Table 1

The origin of the selected yeast strains

Yeast strain	Origin of wine yeast strains
SC 58	must in the tumultuos fermentation stage, made from Cabernet Sauvignon grapes – classical plantation
SC 46	must at the end of fermentation, made from Cabernet Sauvignon grapes – classical plantation
SC 62	must in the tumultuos fermentation stage, made from Cabernet Sauvignon grapes – ecological plantation
SC 23	must in the tumultuos fermentation stage, made from Cabernet Sauvignon grapes – classical plantation

Metabolic characteristics

The selected yeast strains are characterized by a short latency stage, a short to medium, medium or slow fermentation kinetics. The must is clear, with a deposit of creamy-white or yellowish-white, fine, sunk, with a good separation from the glass walls of fermentation tanks, in a low or moderate amount. The foam is fine, in a small amount. (tab. 2).

Table 2

Characteristics of musts fermented by selected yeast strains

Yeast strain	Latency stage	Tolerance to alcohol	Fermentation temperature	Fermentation kinetics	Characteristics of fermented must			
					Must aspect	Deposit		Production of foam
						Aspect	Quantitative assessment	
SC 58	short (< 24 h)	up to 17.5% vol	10-30°	short/ medium	clear	creamy-white, fine, sunk, very good separation	moderate amount	fine, in a low amount
SC 46	Short (< 24 h)	15% vol	10-35°	slow	clear	creamy-white, fine, sunk, very good separation	moderate amount	fine, in a low amount
SC 62	short (< 24 h)	16% vol	15-30°	slow	clear	yellowish-white, fine, sunk, very good separation	moderate amount	fine, in a low amount
SC 23	short (< 24 h)	15% vol	15-30°	medium	clear	creamy-white, fine, sunk, very good separation	moderate amount	fine, in a low amount

1. Composition profile

Cabernet Sauvignon wines are dry (residual sugar ranged from 1.65 g/l, (SC 23) and 1.75 g/l, (SC 58), with an alcohol degree ranging between

11.7% vol. (SC 58) and 13.2 % vol. (SC 62). The volatile registered values under the limit allowed for red wines (tab. 3).

Table 3

Physicochemical parameters of Cabernet Sauvignon young wines fermented with selected yeast strains

Yeast strain	Total acidity (g/l H_2SO_4)	Volatile acidity (g/l CH_3COOH)	Residual sugar (g/l)	Alcohol (% volum)	Total dry extract (g/l)
CS 0	7.05	0.43	1.70	11.5	24.16
SC 58	6.45	0.25	1.75	11.7	22.94
SC 46	6.00	0.27	1.68	12.4	21.76
SC 62	6.38	0.27	1.70	13.2	23.76
SC 23	6.00	0.32	1.65	11.9	22.53

Chromatic characteristics

The use of yeast strains for Cabernet Sauvignon wines fermentation has resulted in a large variability in the color intensity of wines. Maximum value was observed with the *SC* 62 yeast strain which determined an increase in the color intensity with 32,65% compared with the control (fig. 1).

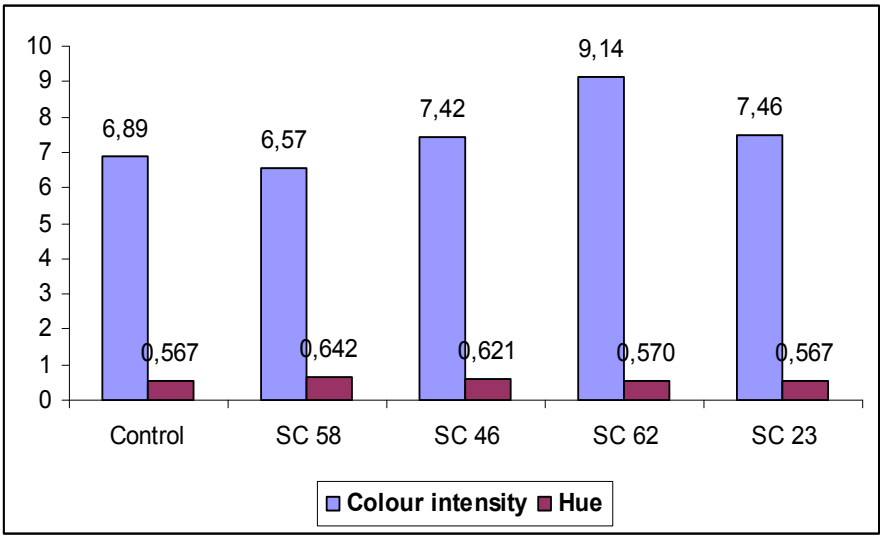

Fig. 1 - Chromatic characteristics in case of the wine fermented with selected yeast strains

Polyphenolic composition

Regarding the total poliphenols content, Cabernet Sauvignon wines registered values closed to the wine obtained in the presence of commercial

yeast used like control, with the exception of wine fermented with SC 58 strain, which showed significantly differences, in a negative way.

The yeast strains used in fermentations determined a high variability in terms of anthocyanin content, the differences being statistically assured. The maximum anthocyanin content was found in wine prepared from SC 62, and the lowest was recorded in wine made with the inoculation of SC 23 (data not shown).

Sensory profile

Cabernet Sauvignon wines are lighter, with a medium colored intensity, equilibrated, with ordinary to strong alcoholic strength, slightly astringent with round tannins.

They are characterized by a fine and complex aroma with fruity (blackcurrant, blackberry, cherry), floral (violet) and vegetal notes.

The wine produced with the strain SC 23, clearly distinguished from the rest of the Cabernet Sauvignon wine samples.

Lighter wine, showed a highest red colored intensity, with a fine aroma, complex and strong in intensity.

The wine is equilibrated, with strong alcoholic strength, round, with ordinary, round tannins, slightly astringent. The equilibrium is ample, with long aromatic persistence (fig. 2).

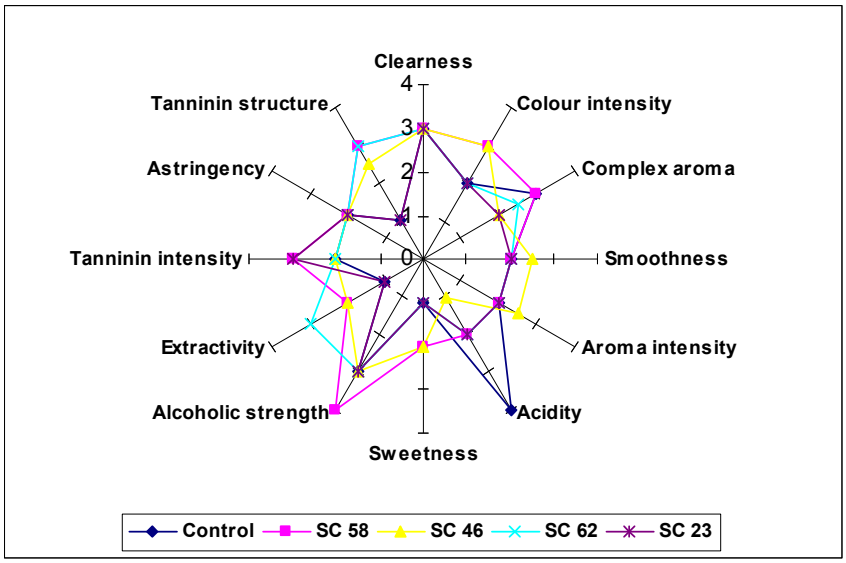

Fig. 2 - Sensory profle of Cabernet Sauvignon wines

Dominant spicy, slightly fruity (blackberry, blackcurrant, cherry) and floral (violet) notes were identified (fig. 3).

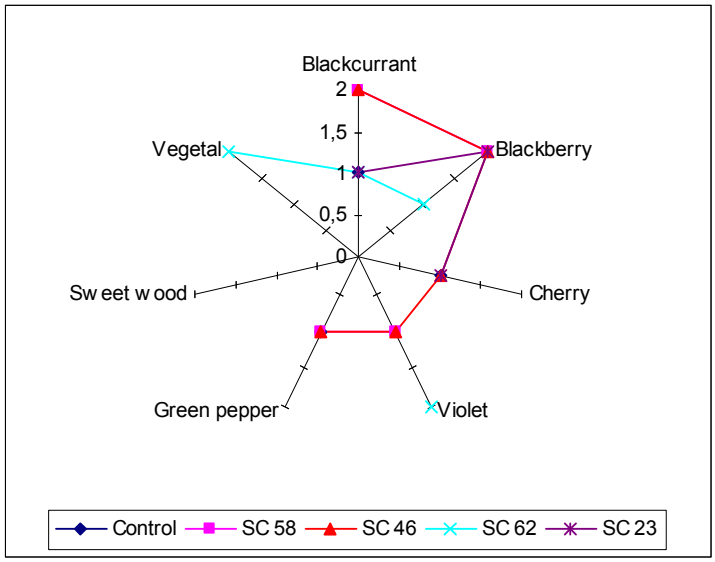

Fig. 3 - Flavour specificity of Cabernet Sauvignon wines

CONCLUSIONS

1. The selected yeast strains contribute positively to the wine's sensory characteristics.

2. From a total of 4 autochthonous yeast strains selected, three strains (*SC* 46, *SC* 62 and *SC* 23) have been kept for the production of wines with improved varietal characteristics. *SC* 58 strain is recommended for the production of qualitative dried red wine.

3. Because of alcohol resistance (up to 17.5% vol) *SC* 58 strain can be used, also, to restart the alcoholic fermentation.

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