RESEARCHES REGARDING THE SECONDARY FERMENTATION IN BOTTLES WITH AGGLOMERATED YEASTS

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Abstract: The yeast called 5 Agglocompact is a dry yeast, very active, which leads to a compact precipitation of the yeasts cells after the secondary fermentation ends. The conditioning of the raw material wine for the foaming agents was accomplished in the same manner as in the case of using the classical yeasts. After preparing the yeast in the vessels where the fermentation mixture was prepared, the stabilized and conditioned raw wine was introduced, then the 5 Agglocompact yeast was prepared for the tirage (20 g/hL wine), then the Brilliant "liquid" for improving the fermentation and the agglomeration effect (60 mL/hL wine) and then the tannin liquid (60 mL/hL wine) to ease the foaming agent's clarification. The quantity of raw material wine and the tirage liquid are the same as in case of using the classical fermentation. Using the 5 Agglocompact yeast determined a faster fermentation than in the classical variant, making the homogenization process easier, reducing the time for realization of the remuage with 2/3 [1].

Keywords: *sparkling wine, secondary fermentation, remuage, tirage*

INTRODUCTION

Obtaining the sparkling wines through the classical Champenoise method offers the possibility of obtaining some products with a special quality but the technological

process itself takes quite a longer period of time and needs high expenses, a lot of labour and huge spaces for production.
As the time went by, the technological process itself was improved and using the 5 Agglocompact yeasts offered better fermentative, remuage and degorgement operations compared to the classical variant. Any improvement of the technological process should not negatively influence the sensorial and physical - chemical characteristics of the foaming agent compared to the one obtained through the classical variant. The efficiency of the classical method can be achieved by using the immobilized yeasts in alginate balls or by using the Millispark cartridge [1-2].

MATERIALS AND METHODS

The secondary fermentation evolution when using the 5 Agglocompact yeast was used was studied, in comparison with the use of the classical variant. The secondary fermentation reached 12 ^{0}C, the bottles being arranged horizontally, the mixture of the raw material wine being obtained from some remarkable sorts of wine like "Feteasca Regala" 60 % and "Riesling" 40 %.
The wine mixture used in experiments was stabilized and conditioned identically with the classical variant but also with the fermentation with 5 Agglocompact yeasts.
The main physical-chemical characteristics of the raw wine are shown in Table 1, and of the bottling mixture in Table 2.

Table 1. *The physical-chemical characteristics of the raw wine*

Alcohol [% vol]	Total acidity [g/L H_2SO_4]	Volatile acidity [g/L H_2SO_4]	Sugar [g/L]	Total SO_2 [mg/L]	Free SO_2 [g/L]
10.4	4.8	0.4	1.5	94	8.6

Table 2. *The physical-chemical composition of the bottling mixture*

Alcohol [% vol]	Total acidity [g/L H_2SO_4]	Sugar [g/L]
8.2	4.2	502

In order to accomplish the classical secondary fermentation, *Sacchoromices cerevisiae 216* yeasts were used. The yeasts were first multiplied in special laboratory conditions, in tanks that ensure their purity. The growth medium was made up of raw material wine, water, circulation liquid and citric acid for correcting the medium pH. The medium was primary filtrated in a hygienic way [3].
The sterilized air was submitted to bubbling for 15 minutes in order to create the best conditions for multiplying. After 5 days from the analysis, the yeast was considered to be ready for use in the bottling mixture in the classical way, having the characteristics shown in Table 3.
The 5 Agglocompact yeast was first introduced into 5 L of a water and sugar solution (100 g sugar/L) for rehydration and was kept there for 60 minutes at a temperature of 30-35 ^{0}C. The whole quantity was then introduced into 100 L wine at 22-25 ^{0}C where sugar was added (50 g sugar/L), being kept in these conditions for 12 hours. The circulation mixture was realized in a container equipped with an agitator used for maintaining the mixture homogeneous during the bottling process. In the case of the classical variant, the raw wine, the circulation liquid, the selected yeasts and the clarification additives (bentonite – 2 g/hL, gelatin –1.5 g/hL and tannin – 2 g/hL) were

Table 3. *The physical-chemical composition of the yeast culture used in the classical variant*

Alcohol [% vol]	10.7
Total acidity [g/L H_2SO_4]	4.2
Sugar [g/L]	41
Cells [no./cm^3]	$32.5x10^6$
Burgeoning yeasts [%]	38
Yeast purity [%]	100

introduced in the container to help the bottles' clarification at remuage [4, 5]. The dose of each component was settled in such a manner that after the homogenization of the bottling mixture, this should contain around 2,000,000 cells/cm^3 and 24 g sugar/L.

In the case of using the 5 Agglocompact yeast, the raw wine, the bottling liquid (the same quantities as in the case of the classical variant), the already-prepared 5 Agglocompact yeast (20 g/hL wine), Brilliant "liquid" for improving the fermentation and the agglomeration effect (60 mL/hL wine), and tannin "liquid" (60 mL/hL wine) in order to ease the sparkling wines' clarification were introduced in the container.

RESULTS AND DISCUSSIONS

After bottling, the bottles were corked and then arranged for fermentation. Using the 5 Agglocompact yeast determined a favorable evolution of the sugar metabolism, presenting a faster beginning of the fermentation compared to the classical variant, thus having a superior evolution [1]. The fermentation's evolution in the two alternatives is shown in Figure 1.

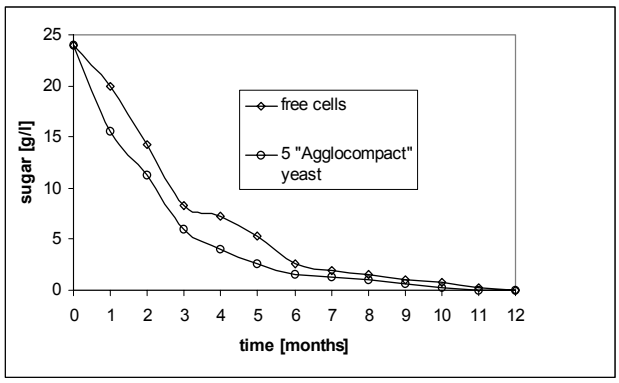

Figure 1. *The evolution of the two fermentation processes*

When using the 5 Agglocompact yeast, the remuage process unfolded in a easier way, the clarification effect of the bottles was accomplished during a shorter period of time being decreased at one third in comparison with the classical variant and, also, the degorgement process unfolded in a easier way as a result of the compact deposition of the yeasts on the fermentation cork.

The comparative sensorial analysis of the sparkling wines obtained through the 2 alternatives is shown in Tab. 4.

Table 4. *The comparative sensorial evaluation of the sparkling wines*

Analyzed samples		Marks							Penalty points
		1	2	3	4	5	6	7	
Sparkling wines obtained through the classical method	A	8	6	9	8	5	4	5	6
	B	6	5	10	4	7	8	9	7
	C	9	6	8	7	6	5	10	7
Sparkling wines obtained through secondary fermentation with the 5 Agglocompact yeast	A_1	6	9	6	5	8	7	8	7
	B_1	5	6	7	4	7	5	8	6
	C_1	6	8	6	9	8	5	7	7

A, B, C, A_1, B_1, C_1 – series of analyzed sparkling wines

The physical-chemical and sensorial analysis on the crude sparkling wines immediately after finishing the secondary fermentation and degorgement showed that in case of using the classical yeasts, but also in the case of using the 5 Agglocompact yeasts the quality parameters have near values. The sparkling process was rich, with a great reminiscence in time and the delicate pearling was persistent in time.
A temperature of 12 ^{0}C determined a favorable evolution of the sugars' metabolism and carbon dioxide accumulation in bottles. The use of the 5 Agglocompact yeasts determines a more rapid start of the fermentation in comparison with the classical variant. It maintains an evolution that is superior to the classical one, the fermentation in the suggested variant being accomplished one month earlier. The horizontal position of the bottles ensures a good metabolism of the sugars, the 5 Agglocompact yeast standing quantities of 20-25 mg/L free sulfur dioxide. After the fermentation process, the yeasts cells agglomerate and form flakes that are easy to notice and separate from the sparkling wine without any difficulty.

The using of the 5 Agglocompact yeast is also convenient as it may be used at any moment of the year because the bottling mixture can be prepared one day before the bottling for fermentation.

CONCLUSIONS

The 5 Agglocompact yeast accomplishes a more rapid fermentation in the bottle, the characteristics of the wine being improved without influencing the typical characteristics.
In case of using the 5 Agglocompact yeasts, the remuage operation evolves more easily, the clearing effect of the bottles being accomplished during a shorter period of time, so the time is reduced with one third in comparison with the classical variant.
The existence of quality parameters of the sparkling wines obtained through the two alternatives, which have nearest values, without significant quality differences was noticed.

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