

STUDIES ON THE INFLUENCE OF THE PELICULAR MACERATION PROCESS ON THE QUALITY AND TYPICALITY OF SEMI-AROMATIC AND AROMATIC WINES

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Abstract

Traditionally, when making white wines, the musts are subjected to clarification and settling, even those from harvests in perfect phytosanitary condition.

The increasingly perfected technical and technological procedures, involved in the operation of clarifying and deburring the musts, lead to the total removal of undesirable impurities, but also of the small fragments of skins and core, the only carriers of varietal aromas specific to each variety. In such situations, wines lacking fruitiness, aromatic "expressiveness" and varietal typicality result. In order to avoid such inconveniences, recently investigations have been intensified on the topic of improving white winemaking technologies, showing that the pellicular maceration is particularly appropriate, especially when the grapes are, at the time of harvesting, in a perfect state phytosanitary and are well matured.

By applying pellicular maceration, notable results are obtained in the vinification of semi-aromatic (Sauvignon) and aromatic (Muscat Ottonel) grapes, but significant improvements were also obtained when using grapes of "neutral" aromatic varieties, such as those belonging to the Chardonnay variety.

Key words: *pellicular maceration, quality, typicality, aromatic wines*

INTRODUCTION

Pellicular maceration was defined as "a preferential technique that consists in the controlled contact between the liquid and solid phases of the must, after crushing the grapes and before pressing, with the aim of extracting, first of all, the compounds of the grape aroma" (Sapis J.C. – 1995). These compounds, as established by previous studies, are overwhelmingly located in the skins of grapes, being the ones that give the specificity of each variety belonging to the species *Vitis vinifera* (Gunata Y.Z. et al. - 1985; Girard B. et al. - 2002). Prefermentative pellicular maceration has

been, in the last 15-20 years, the object of several researches. If in red vinification, maceration has the role of ensuring the extraction of phenolic compounds - especially anthocyanins, in the vinification of white, semi-aromatic and aromatic grapes, preferential skin maceration is practiced in order to extract the compounds responsible for the wine's aroma (Stoica Felicia et al. – 2015, Blesic M. Et al. – 2016, Reynolds J.C. et al. – 2022).

The special interest in this technique, proven by the large number of researches carried out in many countries of the world,

is justified by the profound compositional and organoleptic changes observed in the wines obtained by skin maceration.

Pellicular maceration enriches the musts in volatile compounds (Baumes R. et al. - 1988; Bayonove C. et al. - 1989), but the final richness of the wine in these compounds is not in direct relationship with that of the must (Baumes R. – 1989; Stoica Felicia, 2003).

Pellicular maceration leads to the extraction of a larger part of free aromas from the bound potential. This was demonstrated in the Muscat de Frontignan variety, where increases in terpenol contents related to +45% for linalool, +55% for geraniol, +44% for nerol, +50% for citronellol were found (Voirin S. – 1990). From this bound potential, totally or partially, during the subsequent phases of the winemaking process, the free aromatic potential of the wines can be increased (Dubordieu D. et al. - 1988; Stoica Felicia et al. - 2015).

The effects of pellicular maceration can be amplified by coupling with maceration enzymes. The results on this topic indicated that the enzyme preparations added to the must ensure a better extraction of the must, increase the filterability and clarity of the product and improve the organoleptic characteristics of the wine. It was concluded that maceration in complex with enzymes offers the possibility of processing white and aromatic grapes in good conditions, thus avoiding the use of physical-chemical adjuvants, which can reduce the quality of the wine (Herbin C. et al. - 1990; Gambeta m. J. et al. – 2017, Stoica Felicia, 2003).

MATERIALS AND METHODS

The research was carried out during 2020-2021, taking into account the Sauvignon and Muscat Ottonel varieties from the

Drăgășani vineyard, suitable for the involvement of special preferential operations and biotechnological interventions in order to achieve alcoholic fermentation in the best conditions.

The main objectives were:

- establishing the influence of different preferential operations on the composition and quality of the obtained semi-aromatic and aromatic white wines.

- highlighting the influence of technological and biotechnological factors of primary winemaking on alcoholic fermentation and the basic composition of the obtained wines.

For this purpose, the following aspects were experimented:

- The influence of the duration of pellicular maceration (5, 10, 15, 20 hours) on the contents of non-reducing extract and ash as well as on the ratio between them (ash x 100 / extract);

- The influence of the duration of pellicular maceration on the aromatic terpenic background of Sauvignon and Muscat Ottonel wines from the Drăgășani vineyard. The following contact times between phases were considered: 5, 10, 15, 20, 25, 30 hours. The effects of pellicular maceration duration were compared with total aromas, free aromas and aromas bound in precursors, from grapes;

In the case of all the experiments with pellicular maceration, a minimum antioxidant protection was ensured, with the application of 35 mg SO₂/l, under the conditions of the use of raw materials in perfect ripening and phytosanitary condition.

To achieve these objectives and to analyze Sauvignon and Muscat Ottonel wines, it was determined in the Oenology laboratory of the Faculty of Horticulture and SCDVV Drăgășani the alcoholic concentration of wines, glycerol contents,

acidity, ash and dry extract (Muntean Camelia, Băducă C., Stoica Felicia, 2001).

RESULTS AND DISCUSSIONS

The influence of the pellicular maceration times on the non-reducing extract, ash and ash to extract ratios, parameters and indicators that show both the quality of the wines and their typicality in Sauvignon wines from the Drăgășani vineyard can be seen from the data in Table 1.

Depending on the duration of pellicular maceration, ranging from 0 hours (control variant) to 20 hours (every 5 hours), the non-reducing extract evolved from 19.8 g/l (Ct) to 22.4 g/l (20 hours pellicular maceration). Thus, for 15 hours of pellicular maceration the non-reducing extract increased by 1.9 g/l and for 20 hours of pellicular maceration the increase was 2.6 g/l. In relative values, the increases in extract ranged from 5.2% (at 5 hours) to 13.2% (at 20 hours).

Under the same conditions, ash increased from 1.83 g/l (Ct) to 2.20 g/l (20 hours pellicular maceration), in relative values, the increases were between 6.6% (5 hours) and 19.78% (20 hours).

In accordance with the ash and non-reducing extract contents, the ratio of ash x 100/extract, the indicator of quality, naturalness and legal framework for production, also increased. This ratio evolved from 9,24 % (control variant) to 9,69 % for 15 hours of pellicular maceration and 9,79 % for 20 hours of pellicular maceration, only 0,31 % and 0,21 % below the ideal ratio of 10 % respectively. In relative terms, the proportions of ash to non-reducing extract reached levels between 3,58 % for 5 hours of pellicular maceration and 5,96 % for 20 hours of pellicular maceration.

The positive effects of pellicular maceration are also significant on the terpenic aromatic background of wines from the

semi-aromatic Sauvignon variety and wines from the typical aromatic Muscat Ottonel variety from the Drăgășani vineyard (Tables 2 and 3).

Under the technological conditions of primary vinification, the proportions of terpenic aromas extracted from the solid phase of the muscat increase as the duration of pellicular maceration is prolonged. For the same duration of pellicular maceration, the proportions of extracted aromas are significantly higher for Sauvignon.

Thus, for 15 hours of contact between the mustule phases, the proportions of extracted aromas in Sauvignon exceeded 60% and in Muscat Ottonel reached 51.2%, in both cases in relation to the total terpene contents stored in the grapes.

In both Sauvignon and Muscat Ottonel the extraction is continuous up to 20 hours of contact between the mustule phases, after which the process stagnates or is slightly reduced.

Within the total flavours extracted, for all pellicular maceration durations, free flavours (TVL) dominate in Sauvignon and precursor-bound flavours (TLP) dominate in Muscat Ottonel. When the extracted flavours reached their maximum level: in Sauvignon free flavours accounted for 61,6 % and combined flavours for 38,4 %; in Muscat Ottonel free flavours accounted for 51,7 % and combined flavours for 48,3 %.

When the duration of the pellicular maceration is extended (up to 30 hours), the ratio between the two components of the terpenic aromas is maintained in favour of the free aromas, but at lower levels in the case of Sauvignon, and shifts in favour of the combined aromas when Muscat Ottonel grapes are vinified (53.8% compared to 46.2%).

Table 1. Influence of pellicular maceration duration on non-reducing extract, ash and ash to extract ratios in Sauvignon wines

Variety	Variant	Non-reducing extract g/l	Ash g/l	Ratio Ash x 100 / Non-reducing extract
SAUVIGNON	Direct pressing	19,8	1,83	9,24
	Pellicular maceration 5 hours	20,5	1,95	9,57
	Pellicular maceration 10 hours	20,9	2,12	9,68
	Pellicular maceration 15 hours	21,7	2,10	9,69
	Pellicular maceration 20 hours	22,4	2,20	9,79

Pellicular maceration temperature: 17 – 18⁰C; SO₂ – 35 mg/l;

Table 2. Influence of the duration of pellicular maceration on the terpenic aromatic profile of Sauvignon wines

Variety	Terpenic flavours in grapes					Terpenic flavours – pellicular maceration						
	TOTAL	TVL		TLP		Duration of pellicular maceration hours	Extrase		TVL		TLP	
		µg/l	%	µg/l	%		µg/l	%	µg/l	%	µg/l	%
SAUVIGNON	1585	1166,1	73,7	418,9	26,4	5	927	58,4	502,4	54,1	426,6	45,9
						10	1162	73,3	648,1	55,7	515,9	44,3
						15	1212	76,4	731,6	60,3	482,4	39,7
						20	1214	76,6	748,6	61,6	467,4	38,4
						25	1211	76,3	724,8	59,7	489,2	40,3
						30	1208	76,2	719,6	59,5	489,6	40,5

Table 3. Influence of the duration of pellicular maceration on the terpenic aromatic profile of Muscat Ottonel wines

Variety	Terpenic flavours in grapes					Terpenic flavours – pellicular maceration						
	TOTAL	TVL		TLP		Duration of pellicular maceration hours	EXTRASE		TVL		TLP	
		µg/l	%	µg/l	%		µg/l	%	µg/l	%	µg/l	%
MUSCAT OTTONEL	9808	4062	41,4	5748	57,6	5	3767	38,4	1831,8	48,6	1937,2	51,4
						10	4114	41,9	2029,2	49,3	2086,8	50,7
						15	4758	48,5	2437,0	51,2	2324,0	48,8
						20	5322	54,3	2752,4	51,7	2571,6	48,3
						25	5292	54,0	2514,8	47,5	2779,2	52,5
						30	5314	54,2	2455,2	46,2	2858,8	53,8

CONCLUSIONS

The main conclusions to be derived from this study are:

In conditions of the high favorability for viticulture in the Drăgășani vineyard, the Sauvignon and Muscat Ottonel varieties for white, semi-aromatic and aromatic wines also present an exceptional "behavior", of oenological - qualitative order.

With equal application of the other primary winemaking technological measures, the pellicular maceration temperature influences the extraction of polyphenolic compounds from the solid phase, the more important the higher its level.

In the production of semi-aromatic Sauvignon and aromatic Muscat Ottonel wines, the total terpenic flavours evolve in an increasing manner as the duration of pellicular maceration is prolonged, but not more than 25 hours.

Within the total flavours, both Sauvignon and Muscat Ottonel have increasing proportions of free flavours up to 20 hours of maceration, after which there is some slight decrease.

It can be concluded that the use of pellicular maceration processes has favourable oenological consequences both in terms of the compositional quality of the wines and their typicality, enhancing the aromatic profile of the grape varieties

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