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THEORETICAL AND EXPERIMENTAL RESEARCHES ON HARVESTING TIME FOR WHITE WINE GRAPES FROM THE TRANSYLVANIAN PLATEAU

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Abstract: *This paper aims to develop a theoretical and experimental study on the main qualitative indices of the major wine grape varieties of grapes for white wines produced in the vineyards of Transylvania Plateau. Experimental investigations were developed during August-October 2005 and concerned the determination of key indices values for Royal Fetească, Italian Riesling and White Fetească varieties.*

Key words: *white grapes, harvesting time, sugar content.*

1. Introduction

Wine quality is largely dependent on the quality of raw material entering in wine processing. For this reason the current trend is to know details about grapes' quality as raw material, thus emerging a new science named uvology. This science deals with the study of composition and mechanical characteristics of grapes, with the distribution of chemicals in constituent parts of the grapes, with compositional changes during ripening, and with the influence of external factors on the qualitative features of grapes [7].

From the point of this new science, *technological maturation* may be defined as the moment when grapes have an optimal composition for producing a particular type of wine and a quality class.

It aims to reach *technological maturity* accumulation of large amounts of sugar and reduce excessive acidity in stum report in order to achieve a balanced ratio between these indices. This ratio is called *glucoacidimetric index* that is able to lead to obtaining quality wines. Glucoacidimetric index values (ratio between total sugar content and acidity) increase during maturation and at ripening of the grapes, and with the wine grape varieties this index has values between 30...50.

In the stage of maturation of the grapes, the increased influx of sugars from the leaves corresponds to a large amount of water absorbed by plants from soil increasing the mass and volume of grapes. When the sugars flow ceases almost abruptly the full maturation of the grapes is reached [1].

Depending on variety and climatic conditions that accumulate sugars in the grapes it varies between 125...204 g/liter of wine stum.

In the early ripening grapes glucose predominates and because fructose is

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consumed by the respiration of the grain, the glucose - fructose ratio is equal to 2. At full maturity, the relationship between glucose-fructose balances takes values between 0.95 and 0.99. In over maturing case, the glucose-fructose ratio balances in the favor of fructose, ripe grapes are sweeter due to the sweetness of fructose which is twice higher than that of glucose.

After sugars, organic acids are the most important substances that accumulate in grapes by imprinting to the stum and wine a refreshing acidic taste, helping to extract anthocyanins and odoriferous substances from grapes husks, encouraging breeding and yeast activity during alcoholic fermentation.

The formation of acid is achieved through sugars' oxidation in the grapes grass growing period. Before reaching maturation the grapes' acid content is highest (18...20 g/L must). Entry first fruit (early maturing) is marked by abrupt reduction in acid content of grapes, after which the acidity continues to decline slowly throughout the period of maturation Tartaric acid predominates in grapes (60...70% of the total acids). At the end of grapes ripening, tartaric acid content varies between 3...8 g/L of wine, and higher. Malic acid which is present in grapes is synthesized in the green organs of plants as an intermediate product between photosynthesis and cell respiration. It accumulates large quantities of 15...20 g/L during the herbaceous vine grape growing thus energy balance is positive. During maturation, malic acid is degraded by oxidation, which allows accumulation of sugars [5].

Full maturation of the grapes, for most varieties, is considered to be extended over approximately 5 days.

In favorable years, for the maturation process, the harvest is recommended to be delayed until the grapes are matured in order to facilitate the obtaining of a rich aroma potential.

Establishing the optimal timing for harvest

The harvesting of grapes often coincides with the full maturation, but it can sometimes precede or exceed it. Delaying harvest may result in loss of production. It is recommended that at the date when full maturity is recorded and depending on the category of wine to be produced, vintage be run at the following time intervals: after 5...10 days to develop dry white wine after 20...30 days to produce semisweet wines and sweet ones [4].

Varieties for semidry and sweet wines: Pinot Gris, Traminer Rose, Ottonel Muscat, Italian Riesling, Sauvignon are harvested from vineyards over maturation in most centers in the Transylvania Plateau, harvesting these varieties should be made with 20...30 days after reaching full maturity. Dry wine varieties are harvested around the time indicating full maturity [2], [3].

Grape harvest takes two to three weeks, therefore picking always starts 4...5 days before full maturation of the grapes, to avoid crop losses by delaying harvest. Harvest time should be chosen so that at the mid-harvest, the grapes have the sugar content required for the type of wine that is to be made [6].

According to Order no. 645 from the 15 July 2005 issued by the Ministry of Agriculture, regarding the classification of Romanian wine regions within wine-growing areas of the European Union has approved, for the Plateau Region of the Transylvanian wine-growing zone B, the alcoholic strength of no less than 6.0% vol. ie 102 g/L sugar potential alcoholic strength.

Depending on the variety of grapes used, the quality of grapes and their organoleptic characteristics and composition, to wines with Târnave designation of origin, the following grades may be assigned:

- Designation of origin - picking late (DOC-CT) for white wines such as Traminer, Pinot Gris, Muscat Ottonel;

- Designation of origin collected at full maturity (DOC-CMD) for the Traminer, Pinot Gris, Muscat Ottonel, White Feteasсă, Sauvignon, Italian Riesling and Royal Feteasсă white wines.

2. Material and Methods

The optimal time for harvesting of grapes intended for wine is determined by many factors which present importance like *grape ripeness*, their *health economic conditions*, way *of harvesting* etc.

Vintage running is based on the technological maturity, when the grapes have a composition (sugars, acidity, anthocyanins from black varieties, the varieties aromatic flavor compounds) which provides the possibility of obtaining the desired wine characteristics and qualities. The notion of maturity of grapes can be defined as: physiologically ripe, full, technological, commercial and over maturation. Thus:

- ***Physiological maturity***

Physiological maturity used for improving soil varieties, is reached when the seeds have stopped growing and have acquired the ability to germinate.

- ***Complete maturity***

Complete maturity is reached when the beans have accumulated a large amount of sugars (carbohydrates), when their mass is at its highest level, and the total acidity is moderate. A grape harvested at full maturity ensures quality wines and high grape yield.

- ***Technological maturity***

We consider *technological maturity* or industrial maturity, when the composition of grapes is optimal for producing a particular type of wine or other product. Thus, technological maturity may coincide, precede or exceed the full ripening of the grapes.

- ***Commercial maturity***

Commercial maturity is used in varieties of consumption grapes intended for fresh consumption and represents the optimal development of grapes for consumption, with a sugar content of 130...180 g/L titratable acidity between 5...8 g/L $C_4H_6O_6$.

- ***Over-or post-maturity***

Over-or post-maturity of grapes follows the full maturity and it is characterized by dried grains and sugars concentration increase in grapes. The maturation process can occur both through solar heat action and due to a process of gray rot.

- ***Setting the harvest date***

The setting of the harvest date is done according to the area of culture, variety, location and climatic conditions of plantation crop by following *the evolution of ripening of grapes* (*dynamic aging*).

In this respect, from about 3...4 weeks before the date on which it is estimated that there would be fully ripened grapes, periodic tests should be run (out of 5 in 5 days and then enter the first fruits of 3 in 3 days late maturation) on the following components:

- mass of 100 - grape grains;
- sugar content of - grape;
- titratable acidity of the - grape;
- health of the crop - percentage of moldy grains.

3. Results and Discussion

The tracking of the process of technological ripening for different grape varieties like Royal White wine Feteasсă and Italian Riesling from vineyards of the Transylvania Plateau was done in two stages. The first step was to collect the grape samples and the second was for making actual determinations.

• Grape Sampling

Samples of grapes used to track the evolution of the ripening process should as faithfully represent the average quality of the grapes at the time of determination.

For this reason, a special attention should be given to the plots from where specimen collection is made, the choice vine from which samples are taken, the choice of grapes from the vine, and the size and composition of samples.

The experimental research was carried out in the autumn of 2005. For taking samples of the grape varieties listed have been taken into account: the plots of which the collection of samples have been established from time aiming at field sites - plateau, slope, toe slope, exhibition south, east etc., in such plots chosen were seen lots of 50...60 hubs with normal development, plantation lying on the diagonals. Samples should be taken each time from the same logs to distinctive marks that could be easily identified. Data set for analysis were collected from samples marked hubs 1...2 kg, consisting of fragments of clusters (4...5 grape berries at the top) taken from different parts of the hub (base, middle, top, the sunny and shady side etc.).

Samples thus obtained were subjected to laboratory analysis on the same day that they were harvested. The results of experimental investigations are recorded and their graphical interpretation is represented in the figures below.

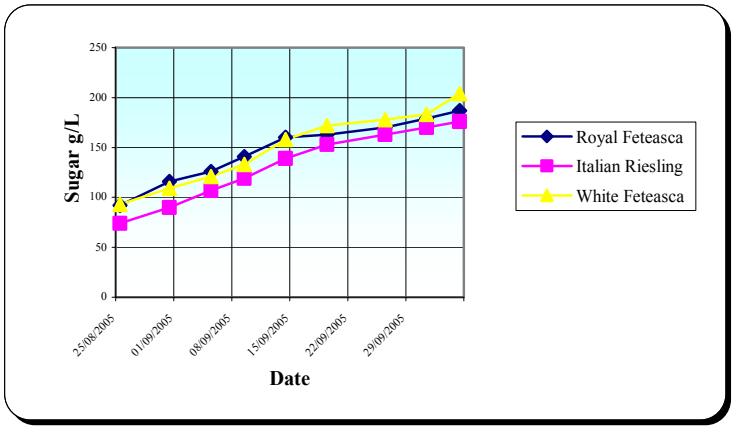

Fig. 1. *Sugar content evolution in the varieties studied*

The chart shown in Figure 1 shows the evolution of the relative content of the wort sugars in g/L. Sugar content increases continuously from the first signs of ripeness of the grapes as a result of the accumulation process, and as a result of increase in concentration in the period of over maturation.

Total acidity of the grapes stum (Figure 2) gradually decreases throughout the ripening stage and then over maturation stage of the grapes, due to dilution phenomena, oxidation and neutralization.

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Grapes grain mass growth during the ripening of grapes (Figure 3), reaches maximum value at the time of full maturity and gradually decreased over the ripening period (over aging) as a result of water loss by evaporation, and climatic conditions of

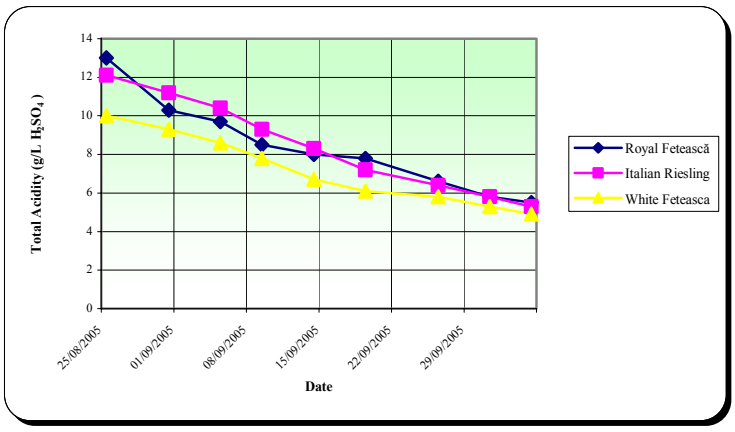

Fig. 2. *Total acidity evolution in the varieties studied*

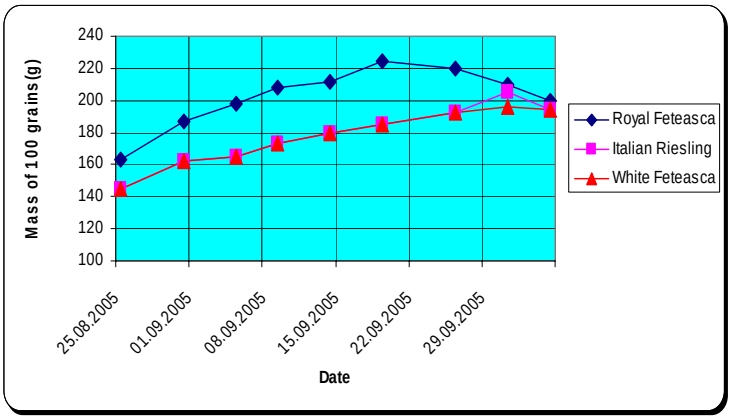

Fig. 3. *100 grape grains mass evolution*

the year. At full maturity, there is the greatest grape production (kg/vine, tons/ha) and the highest absolute sugar content.

4. Conclusions

By following the evolution of grain weight, full maturity of grapes was determined when the sugar content is nearly constant for 2…3 days and the grape grains have reached the maximum mass.

Depending on the indices studied in this paper, the date for starting harvest is determined, a date which is chosen 5 days before the date on which the grapes reach full maturity.

According to the results obtained in this study, the kind of wines that are to be obtained is determined. In this case, particularly top-quality wines can be obtained with appellation of origin.

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