RESEARCH ON EXPERIMENT THE HYDROCYCLON SLV02 FOR THE PARTIAL SEPARATION OF THE MUST

CERCETĂRI PRIVIND EXPERIMENTAREA HIDROCICLONULUI SLV02 PENTRU SEPARAREA PARȚIALĂ A MUSTULUI

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Abstract. *In the wine-making industry are cases in which the must has a high content of suspensions with density exceeded by far the density of the liquid phase. A solution for removing these impurities is to use hydro-ciclons which are part of centrifugal separators category. The experiment is to test a new type of hidrociclon with a special construction and has pursued the efficiency the partial separation process from must impurities, depending on the change of speed in suspension equipment. Research has been carried out in "Vasile Adamachi" Teaching Experimental Farm, Iaşi. Following the obtained results interpretation, has been established the experimental version that is leading to a optimal process improvement.*
Key words: must, centrifugal separation, hydrocyclon

Rezumat. *În industria vinificației se întâlnesc cazuri în care mustul are un conținut ridicat de suspensii a căror densități depăşesc cu mult densitatea fazei lichide. O soluție pentru îndepărtarea acestor impurități este folosirea hidrocicloanelor ce fac parte din categoria separatoarelor centrifugale. Experimentul constă în încercarea unui nou tip de hidrociclon de o construcție specială şi s-a urmărit eficiența procesului de separare parțială a impurităților din must, în funcție de variația vitezei de alimentare cu suspensie în utilaj. Cercetările au fost efectuate în Ferma Didactică Experimentală „Vasile Adamachi" Iaşi. În urma interpretării rezultatelor obținute, s-a stabilit varianta experimentală optimă, ce duce la îmbunătățirea procesului de separare.*
Cuvinte cheie: must, separare centrifugală, hidrociclon

INTRODUCTION

During the technological process of winemaking are cases in which wine has a high content of suspended particles whose density exceeds the density of liquid phase (Luca, 1997).

A solution for removing these impurities is to use centrifugal separators (Svarovsky, 1984, Țârdea et. al., 2010).

The separators are used for the partially clarified of must (Luca, 1997), reducing the risk of completely removing the microorganisms that help to start the alcoholic fermentation.

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MATERIAL AND METHODS

Research has been carried out in "Vasile Adamachi" Teaching Experimental Farm, Iași. In order to obtain the must, the grapes are processed by their passage through the declustering crushiers and pneumatic presses.

In the experiments, to remove the sediments using the hydrocyclone, was used must obtained without pressing the pomace, must from press I (obtained at a pressure of 1.5 barr) and must from press II (2 barr). The more, pomace was subject to greater pressure for a long time, more the must was enriched in suspension.

The musts obtained at various pressures, were separately subjected to separation porcess by using hydrocyclone SLV02 (fig. 1).

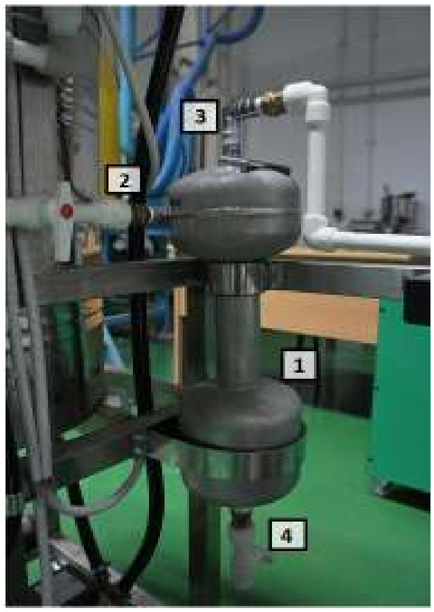

Fig.1. Hydrocyclone SLV02:
1 – cylindrical body; 2 – input connection for must; 3 – output connection for the partially cleared must; 4 – connection for sediment purging

Must obtained from draining or pressing, can be separated from impurities in decanted and thin sediment settling in a centrifugal force field created by the tangential entry unit (2), with its high speed (Panturu et. al., 1996).

Mixture performs a rotating helical downward to the bottom of the machine and then moving upward all helical, coaxial with the descent movement. Meanwhile, the particles are deposited on the lower walls and easy phase moves to center, through the tube between the two bodies, following an upward motion, eliminating at the top of the connector 3.

For supplying the must in the hydrocyclone was used a multistage centrifugal pump. By varying pump speed, has achieved different turbidities of samples obtained in the study.

The suspension efficiency separation of must can be determined by measuring the nephelometric turbidity unit (NTU) with Turbo 555 turbidimeter. Nephelometric turbidity unit value is lower as the liquid is less feculent.

RESULTS AND DISCUSSIONS

For the three experimental variants studied, nephelometric turbidity unit was measured at the beginning and end of the separation process. The variation threshold speed, due to the requirements of the equipment company producing, was between 1200 and 2100 rpm (revolution per minute).

In these conditions, the NTU value, for the must obtained without pressing the pomace at the input connection was 1151,4, for the must from press I was 1274,7, while from press II was 1435.3.

In table 1 are presents turbidity results for the must obtained without pressing the pomace.

Table 1

Turbidity values for the must obtained without pressing the pomace

Revolution (rpm)	Must turbidity at the hydrocyclone feeder (NTU)	Cleard must turbidity (NTU)
1200	1151,4	982,3
1500		472,5
1800		280,1
2100		753,2

We can observe in table above, that the speed of 1200 rpm and 2100 rpm, turbidity values (NTU 982,3, respectively 753,2 NTU) are superior to those obtained at speeds of 1500 and 1800 rpm (472,5 NTU, respectively 280,1 NTU).

From these data it can be deduced that at low speed (1200 rpm) is not sufficient to create a centrifugal force to separate particles of liquid.

At the speed of 2100 rpm is observed that the final value must (753,2 NTU) is close to the original (1151,4 NTU). This may be due to excessive flow velocity of must in a short period of time through the hydrocyclone, unable to separate particles from must.

The lowest turbidity, respectively 280,1 NTU is obtained at a pump speed of 1800 rpm, being a distinctive difference from the value of must turbidity on feeding the machine.

In table 2 and 3 are the must turbidity values obtained from press I, respectively must turbidity values obtained from press II.

Table 2

Turbidity values for the must obtained at press I

Revolution (rpm)	Must turbidity at the hydrocyclone feeder (NTU)	Cleard must turbidity (NTU)
1200	1274,7	1041,7
1500		532,4
1800		339,5
2100		812,3

From table 2, we can observe that the lowest turbidity, 339,5 NTU, was obtained by varying the speed to 1800 rpm. Moreover, it can identify also in table 3 that at the same speed of 1800 rpm can be obtain the best turbidity, respectively 425,9 NTU.

Table 3

Turbidity values for the must obtained at press II

Revolution (rpm)	Must turbidity at the hydrocyclone feeder (NTU)	Cleard must turbidity (NTU)
1200	1435,3	1135,8
1500		670,2
1800		425,9
2100		845,3

CONCLUSIONS

1. For partial clarification of musts we recommend to use centrifugal separators.

2. The optimal solution to use hydrocyclone SLV02 for partial clearing of must, is to use the pump at speed of 1800 rpm.

3. The hydrocyclones can be used for clarification must, because of the minimal maintenance costs, the main advantage being the lack of moving parts, resulting a more efficient cleaning equipment.

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