RESEARCH ON OPTIMIZING THE PRESSING PROCESS ON THE VERTICAL HYDROPRESS WITH BELLOWS

CERCETĂRI PRIVIND OPTIMIZAREA PROCESULUI DE PRESARE A HIDROPRESEI VERTICALE CU BURDUF

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Abstract. *Rapid increase of pressure working on grape pulp is not permitted, because it causes the local compaction and powerful kicks, increasing loss of hydraulic pressure in the layers of pulp and membrane separation. The research has the purpose to highlight the pressing process efficiency by swelling the bellows press with water under pressure in the first variant, and swelling the bellows with compressed air in the second variant. By analyzing the results on the yields obtained by varying the values of pressure and the process duration, it was established the optimal variant of using vertical bellows hydropress.*
Key words: hydropress, must yeld, optimization

Rezumat. *Creşterea rapidă a presiunii de lucru asupra pulpei de struguri nu este admisă, deoarece provoacă compactizări locale şi lovituri hidraulice puternice, mărind căderea de presiune în straturile de pulpă şi pe membrana de separare. Cercetările au ca scop scoaterea în evidență a eficienței procesului de presare prin umflarea burdufului cu apă sub presiune, în primă variantă, şi umflarea burdufului cu aer comprimat în cea de-a doua variantă. Prin analiza rezultatelor cu privire la randamentele obținute prin variația valorilor presiunii şi duratei procesului, s-a stabilit varianta optimă de utilizare a hidropresei verticale cu burduf.*
Cuvinte cheie: hidropresă, randament în must, optimizare

INTRODUCTION

In order to obtain quality wines, pressing the pomace is important to make in the staple presses with inflatable bellows or pneumatic presses (Popa and Mureşan, 2007).

The must yield, at pressing the pomace, depends on the pressure, the specific growth rate of the pressure on the pulp and the duration of pressing process (Bălan, 1977).

The rapid growth of the working pressure of grape pulp caused local compaction and strong hydraulic strikes, increasing the pressure drop in the layers of pulp and on the separation membrane. All this leads to enrichment of musts in suspensions and phenolic substances (Luca, 1997).

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By introducing compressed air into the bellows, the pressure is radial, progressive and flexible. Through the existence of elastic pressure surface, swelling the bellows with spare air subjected pressing material, which leads to a must with less suspensions and poor in substance from the solid parts of grapes (Cotea et al. 2010).

MATERIAL AND METHODS

The research took place in Teaching Experimental Farm "Vasile Adamachi" Iasi. To study the pressing process of the staple presses, experiments were made on a vertical press with bellows (figure 1).

The press includes a rubber bellows, that can be swell with water or air under pressure, inside a perforated stainless steel cart. The pomace is introduced into the space between the bellows and cart. To prevent the squirt of the must, the cart is doubled on the outside with a plastic pouch. After loading the press, it set the cowl, then will open de water/air feeder and adjust the pressure. To discharge the marc, it's just stand on the perforated metal basket.

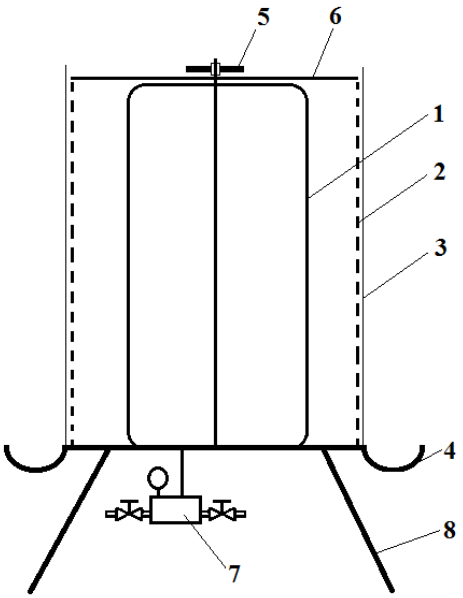

Fig. 1 - Vertical hydropress with bellows
1 – bellows; 2 – stainless steel cart; 3 – pouch; 4 – channel for must collection; 5 – clamping device; 6 – cowl; 7 – pressure adjustment device; 8 – metal frame.

There have been two experiences where keep track the pomace pressing efficienty. In the first experiment, the bellows was filled with water, and in the second experiment, the bellows was inflated with compressed air.

For filling the bellows we use water from city water supply. Having a direct supply and the pressure is unstable, in the pressing process, there be strong hydraulic strykes. In this case we can not ensure a slow increase of the pressure.

In order to provide a controlled pressure and avoid hydraulic shocks, we used compressed air obtained from an air compressor.

For each experiment, were subjected to pressing different amounts of grapes (V1), pomace obtained by crushing the grapes (V2) and pomace obtained by crushing and declustering the grapes (V3).

Swelling of the bellows with air was achieved by gradually increasing the operating pressure from 1 to 2.5 barr (from 0.5 to 0.5 barr).

Depending on must yields obtained in the experiments, it was established the best solution to use the vertical bellows hydropress.

RESULTS AND DISCUSSIONS

In table 1 are presented experimental results obtained by pressing the grapes and pomace using the hydropress filled with water.

It can be observed that, the must yields are higher at the pressed pomace obtained only by crushing the grapes (74,3 %), compared to yields obtained from pressing whole grapes (61,92 %) and pomace obtained by crushing and declustering the grapes (71,02%).

Higher yields can be caused by repeated and powerful hydraulic strikes, resulting from the water pressure surge in the bellows.

Table 1

Yield obtained by pressing whole grapes and pomace using water for filling the hydropress bellows

Experimental variant	Grape/pomace weight (kg)	Must weight (kg)	Solid fraction weight (kg)	Must yield (%)
V1	10	6,38	3,62	63,8
	11	6,87	5	62,5
	12	7,35	4,65	61,3
	13	7,81	5,19	60,1
Average	*11,5*	*7,10*	*4,61*	*61,92*
V2	23	17,5	5,5	76,1
	24	17,92	6,07	74,7
	25	18,45	6,55	73,8
	26	18,87	7,13	72,6
Average	*24,5*	*18,18*	*6,31*	*74,3*
V3	23	16,65	6,1	72,4
	24	17,23	6,56	71,8
	25	17,65	7,35	70,6
	26	18,01	7,98	69,3
Average	*24,5*	*17,38*	*6,99*	*71,02*

Analysing the results in table 2, are presented the experimental results on the three experimental variants (V1, V2 and V3), only as the bellows was inflated with air, we identify the same effect as we used water.

Yields must are higher in experimental variant V2 (72,2%), followed by V3 (68,92%) and V1 (59,82%).

Based on the results achieved in the two tables, it shows that using water to encrase pressure on the pomace, there are obtaining higher yields compared with the case were has been used compressed air.

Also it may reveal that by increasing the amount of grape/pomace pressing subjected, yields must reduce results that can lead to decreased productivity, for obtaining a wine with high quality.

Table 2

Yield obtained by pressing whole grapes and pomace using compressed air for filling the hydropress bellows

Experimental variant	Grape/pomace weight (kg)	Must weight (kg)	Solid fraction weight (kg)	Must yield (%)
V1	10	6,17	3,83	61,7
	11	6,94	4,35	60,4
	12	7,1	4,9	59,2
	13	7,54	5,46	58
Average	*11,5*	*6,86*	*4,63*	*59,82*
V2	23	17,02	5,98	74
	24	17,42	6,58	72,6
	25	17,92	7,08	71,7
	26	18,33	7,67	70,5
Average	*24,5*	*17,67*	*6,82*	*72,2*
V3	23	16,17	6,83	70,3
	24	16,72	7,27	69,7
	25	17,12	7,87	68,5
	26	17,47	8,52	67,2
Average	*24,5*	*16,87*	*7,62*	*68,92*

CONCLUSIONS

1. Using water to fill the bellows press is obtained higher must yields (70%) compared to yields obtained using air (67%).

2. For obtaining quality wines, it is recommended to use the musts obtained by pressing whole grapes with lower yields.

3. The optimal variant to use the vertical hydropress with bellows, obtaining the best performance in the must yeld, is to fill the bellows with water and pressing the pomace resulted from crushing grapes.

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