

Masi Agricola: Tangential Flow Filtration with Pall Oenoflow™

Tangential flow microfiltration systems designed for oenological use have spread rapidly in the wine producing areas of the world. Various reports have already been published on the experiences in Italian wine producing companies with the Pall Oenoflow system introduced about 10 years ago. The heart of Oenoflow is the symmetric hollow fiber PVDF membrane which provides great mechanical resistance even with exposure to aggressive chemical cleaning regimes.

In the XL version, the modules have a particularly high filter area which allows the use of compact units even for high flow requirements. All the materials of the Oenoflow modules meet the requirements of European Directive 2002/72/EC for food contact. The Oenoflow system incorporates two automated features, the Back Pulse and the Dynamic Solids Control (DSC) to break up the stabilization of the gel layer (stable state of contamination) in order to keep the membranes as clean as possible.

Filtration studies were carried out on Amarone Costasera Masi. The technical data (see Figure 1) shows that this is a full-bodied wine with intense ruby color. This is not easy to achieve because of the fining time (at least 3 years), the decanting process and sulfurization. Therefore, it is critical that filtration does not thwart the efforts of years of work.

Most of the problems caused by the wine filter aid system (sedimentation) were eliminated in 2003 with the introduction of tangential flow filtration tests on Masi wines and, in particular, Amarone Costasera. With installation of their own Oenoflow system in 2007, optimal filterability values are obtained in a single operation. The average hourly yield is higher (10,000 l/hr) compared to the previous average, and the volume of product loss following processing is half that compared to the preceding system (5 per 1000). There is considerable operational security through use of a touch screen in which ten parameters can be entered to initiate automatic filtration.

The filtration modules are transparent in order to visually confirm proper filtration during operation and the presence of turbidity or solids after rinsing. The Oenoflow 10XL is compact and the position of the instrumentation and tubing connections are convenient and accessible. After preparation of the transport lines (time required about 40 min.), the innovative Tank Distribution System (TDS) can be programmed for operation. Filtration can be scheduled based on tank levels as the systems can operate on very turbid products. Cleaning operations are simple and automated and the filter hygiene is achieved without dismantling the machine. Washing, however, requires a greater quantity of water (about double) compared to previous system. This process is similar to pre-bottling.

Once fining is complete (24 months in the cask), the Amarone is sent to large tanks where it remains for about one month. The wine is then drawn off by a transfer pump to the Oenoflow 10XL via a stainless steel pre-filter screen. The filtration modules are fed through a second pump which ensures recirculation of the wine that then undergoes 'tangential' flow filtration.

The Oenoflow system performance was compared to the method previously used (filtration with diatomaceous earth in sedimentation). The alcohol level, color, total extractables, maximum filterable volume (V_{max}), total sulphates, and turbidity of the product before and after filtration were assessed for objective evaluation of the new technique. The results are shown in Figure 2.

Due to the high flow rates and production volumes, turbidity was used as the specification to monitor the process. Turbidity measurements utilize instruments which are easy to use and provide faster results than the filterability index or V_{max} measurements. For effective use of this specification, a correlation curve for V_{max} v NTU (Figure 3) was constructed. Using samples of wine with different levels of turbidity, the V_{max} was measured under constant conditions. It was noted that, for the Masi production process, a wine is at risk with values higher than 0.3 NTU. Additionally, a straight forward measurement of turbidity is sufficient for evaluation of the performance of Oenoflow 10XL. Lastly, the Masi Technical Unit Panel did not notice any substantial differences in the taste and odor when comparing the samples of Amarone filtered by sedimentation and tangential flow technology.

This type of system has numerous advantages – modern technologies allow significant improvements in cellar processing, maintaining absolute respect for the quality and typicality of the product. The numerous advantages found operating with tangential filtration include: advanced automation which allows for considerable reduction of labor costs or, where these resources remain, their use in other cellar operations,

the resolution of problems linked to the handling, dosing and disposal of filtration aids and, lastly, the lower environmental impact and safety for the operator.

With reference to the Amarone Masi Costasera, it was noted that the temperature during filtration does not change significantly so the taste and odor qualities of the product are perfectly maintained with the advantage of ideal clarification of the wine through a single filtration. This process keeps the specific characteristics of Amarone Masi Costasera whole.

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Figure 1 Amarone Costasera technical details

MASI

COSTASERA AMARONE CLASSICO 2004

Le coste rivolte al tramonto, in Valpolicella Classica le migliori per un Amarone di rosso. Qui, dove è più lunga la giornata, le vigne che guardano il Lago di Garda si avvantaggiano del riflesso della sua luce e del suo clima più mite. L'Amarone, vino unico per origine, varietà antiche e metodo di produzione (vinificazione di uve appassite per 3-4 mesi sui grappoli), esprime in Costasera particolare morbidezza e complessità. Abbinare con carni rosse, caccagione e formaggi stagionati. Grande vino da fine pasto e da invecchiamento.

Tipologia Amarone della Valpolicella Classico DOC.

Origine Da vigneti collinari di Masi situati nelle coste rivolte al tramonto (ovest-sud-ovest) nei comuni storici di produzione (Mariano, Negrar, San' Andrea e San Pietro in Cariano). I terreni sono rossi scuri su calcari eocenici e compati rossi su basalti.

Vitigni 70% Corvina 25% Rondinella 5% Molinara.

Vinificazione L'Amarone è frutto dell'antico metodo dell'"appassimento" delle uve concoscute sin dai tempi dei romani. A fine settembre-inizio ottobre i migliori grappoli selezionati in collina sono riposti sui tradizionali grappoli di bambù (arati), in frutte dove l'appassimento naturale è controllato dal sistema NASA. A fine gennaio le uve fanno perso il 30% del loro peso, acquisendo una maggior concentrazione zuccherina. La sola Corvina è naturalmente attaccata dalla "botrytis" (muffa nobile). Seguono delicata pigiatura, parziale diraspamento, fermentazione di 45 giorni in grandi botti di rovere di Slavonia o contenitori in acciaio a temperatura fredda naturale, fermentazione di completamento per 30 giorni in botti da 30-40 hl con apposito inoculo di lieviti selezionati altamente resistenti all'alcol e fermentazione malolattica.

Affinamento 24 mesi: 80% in botti di rovere di Slavonia da 40-80 hl e il rimanente 20% in piccoli fusti di Allier e rovere di Slavonia (40% rovere, 30% il riempimento, 30% il riempimento). Seguono almeno 4 mesi di bottiglia.

Vite sulla scaffale 30-35 anni.

ABBINAMENTI
Vino importante che accompagna piatti saporiti, carni rosse grigliate o arrosto, caccagione, funghi saporiti e leggermente piccanti (ad. es. parmigiano). Vino da meditazione e ottimo vino da fine pasto. Temperatura di servizio 18-20° C.

Vendemmia 2004 Buono l'andamento vegetativo nei primi mesi dell'anno. Le piogge di giugno hanno ritardato l'accrescimento dei grappoli, che ha poi recuperato grazie al clima caldo e secco di luglio. La maturazione delle uve è stata favorevole, grazie a precipitazioni limitate e temperature leggermente superiori alle medie stagionali nel mese di agosto: clima mite che si è prolungato anche nel periodo vendemmiale di settembre e ottobre. La raccolta è iniziata a inizio ottobre con leggero ritardo rispetto alla media degli ultimi anni. I grappoli si presentavano sporgoli, perfettamente sani, le uve avevano buon grado zuccherino, buona acidità e ottima colorazione. La quantità è stata del 10-15% superiore alla media. Buono l'andamento dell'appassimento.

Note organolettiche Colore rosso rubino impermeabile con riflessi violacei allunghi. Piatto, molto intenso e complesso al naso, si avverte la sostenuta alcolicità tra note dolci di prugna appassita e balsamico. Secco e morbido al palato, presenta l'usuale ciliegia rossa accompagnata da evidenti note di cacao e cannella. Piacevolmente lungo e avvolgente con tannini delicati.

Dati di analisi Alcol 14,85 % vol., zuccheri 8 g/l, estratto secco 31 g/l, acidità totale 5,82 g/l, pH 3,44.

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Fig. 2 Chemical-physical parameters (% increase-decrease) obtained from 15 filtrations of Amarone Costasera (different years) compared to the same starting wine.

Filtration technique	Alcohol (% vol.)	Total extracts (gm/l)	Color intensity (ABS 420 nm + 520 nm)	Color tone (ABS 420/ABS 520)	Total sulfates (K2SO4) (gm/l)	Vmax (ml)	NTU	Temp. (°C)
DE brightener	-0.59	Neg.	-7.2%	2%	12.8%	3500	NP	Neg.
Oenoflow 10XL	-0.37	-0.36%	-4.5%	-1.5	Neg.	3600	0.05	1°C

Note: NTU = Nephelometric Turbidity Unit; NP = Not performed; 1 and 2 = average values

Fig. 3 Correlation Vmax v NTU

