

Technology in Food Processing



• CENTRIFUGAL SEPARATORS
• MILK/CREAM STANDARDIZERS



• UHT ASEPTIC PLANTS



• LOW TEMP. CONCENTRATORS (20°C)



• ESL PASTEURIZERS



• POLYPHENOLS EXTRACTORS
(from red grapes)



• JUICES PREPARATION UNITS



• ENGINEERING - AUTOMATION

APPLICATIONS:

- MILK AND BY-PRODUCTS
- FRUIT JUICES AND SOFT DRINKS
- WINE
- BEER
- LIQUID EGG
- SPECIAL PRODUCTS

OENOLOGICAL SECTOR

REDA

Food Processing Plants



CENTRIFUGES

REDA

Food Processing Plants

REDA SELF-CLEANING CLARIFIER

FOR THE CLARIFICATION OF WHITE AND RED WINES

The centrifuge uses a separating system by the way of the specific weight differential between a liquid and a solid.

The higher is this differential and the easier will be the separation.

The system is similar to the static decantation, that is well known by the winemakers, but is simplified and amplified by the rotational force that is thousand much more higher than the gravity force.

This obvious introduction is to explain why, when we are talking about centrifuges in winemaking, we have to refer more to the decantation than to the filtration.

The filtration essentially works by the dimension differential and not by the weight.

So all that improve the results of the static decantation is extremely enhanced in a centrifuge that enable the highest results in the shortest time.

The last generation centrifuges manufactured by REDA, are able to reach very high rotational forces, avoiding any oxidation of the product and working automatically.

Just for example the rotational force at the external part of the disks, where separation is starting, is around 7'500 / 8'000 g (that means 7'500/8'000 times the gravity force).

WINE CLARIFICATION

The wine clarification by the high speed centrifuge proposed by REDA enable to reach, in terms of flow-rate per hour and wine-shining, incredible and enthusiastic results.

The wine coming from the fermentation could reach a level of turbidity of 2'000 - 3'000 NTU, After the REDA centrifuge this level fall down to 15 - 25 NTU: practically shining.

This great result is due to the fact that at a certain centrifuge force all the exhausted yeasts will be completely separated.

The sludge coming from the centrifuge-separator is compact, but is still easy to pump it out.

The absence of product oxidation and the possibility to clarify even very dirty products (REDA centrifuges are self - cleaning) let us to consider the centrifuge the best solution to clarify wines coming from fermentation that combines the best results in the shortest time with the consequent reduction of the labor costs; the centrifuge is the most automated solution compared with any other filtration system.

Clarifying bentonites and jellies is extremely easy with a centrifuge with the only recommendation to increase the frequency of the discharges.

In case of doubts we have just to refer to separations methods in the static clarification; for example the coal is harder to clarify because of its lightness (70-80% clarifying).

Advantages of the centrifuges compared with fossil flour filtration systems:

- Big reduction of time and possibility to process the wines directly from the fermentation while the fossil flours have some problems to process wines coming directly from the fermentation.
- The operating costs of a centrifuge are negligible if compared with the fossil flours costs necessary to the filtration.
- Reduction of the disposal costs of the filtration exhausts: the centrifuge's exhausts are composed of yeasts and something else all coming just from the fermentation of the must.
- The organoleptics characteristics of the wines are kept unchanged (the wine is not stressed).
- In the case of red wines avoiding filters (fossil flours or others) and the high speed process enable to fit the color; that's why the centrifuge increase the color level on the red wines.

The tangential filtration system that is proposed as the "solution" of all filtration problems indeed is just theoretical:

- The centrifuge is not a filter (the separation is the results of the weight and not the dimension differential)
- The centrifuge grants high flow-rate at even low temperature (sparkling wines are normally processed at 0°C).
- If we install the centrifuge before the tangential filters (as pre-clarification) we will improve the filtration as well the filtering cartridge life (that are the main cost of this filtration system).

SPARKLING WINES

In the case of sparkling wines REDA propose the centrifuge "S" type able to process sparkling wines without any CO² losses.

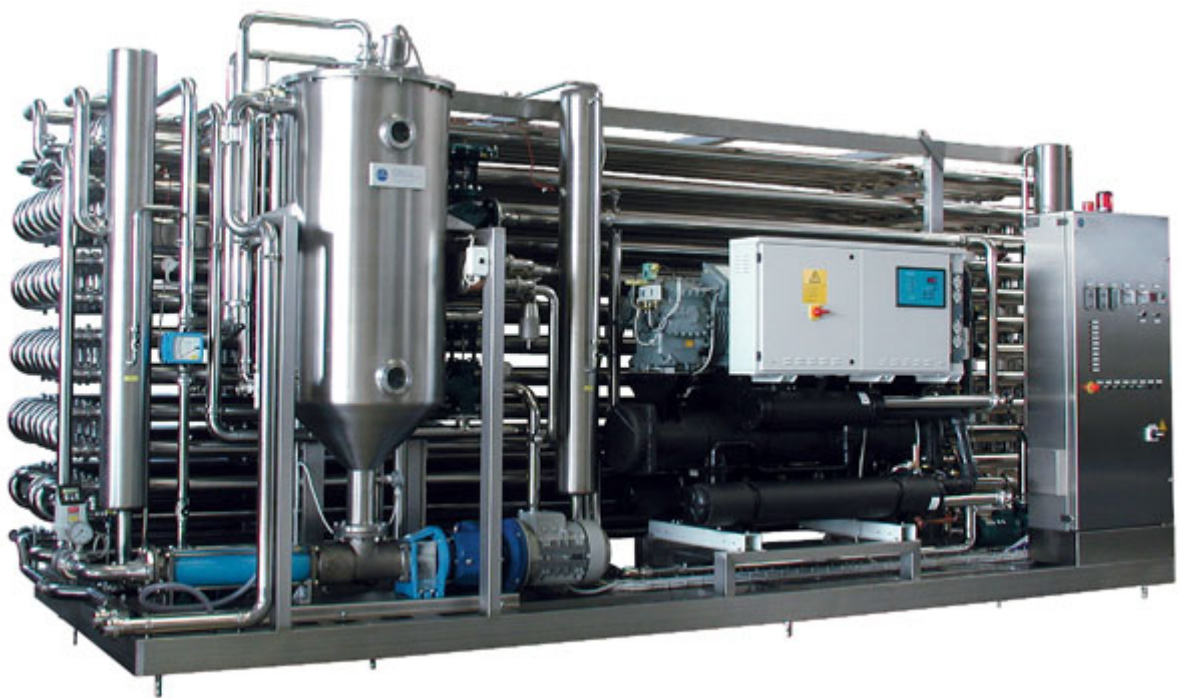
The high efficiency clarification system enable to feed directly the cartridge filter and so the bottling.

The limit of this system is colloidal substance that prevent to reach good filtration results.

CONCLUSIONS

The centrifuge is a polyvalent machine in winemaking that respect an "ecological" treatment of the wine. It reduces organization problems and the disposal of exhausts. It enables to process small wine quantities.

Finally is an useful machine for whose that need to work in the shortest time maintaining constant good results on the final products.



POLYPHENOL EXTRACTORS

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"REDA" POLYPHENOLS EXTRACTOR

FOR THE EXPLOITATION OF RED GRAPES POTENTIAL THROUGH A BETTER EXTRACTION

Introduction:

The extraction dynamics of polyphenols from red grapes and their relatives studies on tannins and anthocyanins quantity and quality present in the obtained wines have been object of a big interest in the whole oenological world in these last years.

It is known in fact that during normal maceration only 30 to 50% of tannins and anthocyanins present in the grape skin are extracted.

The Oenologists well know that the quantity and quality of the extracted polyphenols compounds shall confer to wine some positive notes as: roundness, body, colour and volume or negatives as: astringent, bitter, herbaceous tastes, etcetera.

The ability to know how to extract the best, both in quality and quantity, will remain the target to get, chance per chance, year after year, for oenologists and for oenological equipments manufacturers too.

To find a valid base technique generally successful for various red grapes should surely represent a goal of big interest.

The new technique should be added to other base techniques, introduced not many years ago, like cool controlled fermentations, or like malolactic fermentations or even the self-enrichment of grapes must through cold evaporation under vacuum.

At the moment all techniques used to improve the extraction utilize the "cellular break-up of skins" in order to aid the polyphenolic substances diffusion during fermentation.

So there are used: rotative macerators, continuous immersion systems for skins in the grape must, remounting systems with a wide choice of programs, fermentation times and temperatures.

In order to obtain a certain quality wines rather long maceration times are necessary and this often means the undesired extraction of bitter and astringent tannins that compromise the result.

A new technique was introduced by the French about 10 years ago and consists on a stemmed grapes heating, partially drained, up to 85/90°C, on a thermic holder for a certain time and a subsequent quick cooling to 30/35°C on a vacuum tank that shall cause, in the opinion of the system authors, a "cell cracking" event with immediate release of polyphenolic substances.

This process surely causes a strong extraction of tannins and anthocyanins, but the system presents also some weak points:

Wines with a lot of lees (bitter and astringent):

The high temperatures used, the undervacuum effect and the mechanical handling of the product weak by the treatment, in the end crush the skins causing an abnormal quantity of lees and the consequent astringent taste.

High energetic costs:

The system doesn't provide any thermic recovery so that big masses have to be heated from 15/20°C to 85/90°C and then cooled at 25/30°C with very high energetic requirements.

High plant engineering costs:

The cost of the plant is very high, also because it is very complex and of big dimensions. Moreover costs of boiler to produce hot water and refrigerator groups for cooling water necessary for the process are very high.

REDA's system

Since 1998, after a first research phase to exactly understand what the oenologic world asked for and what manufacturers offered, REDA SPA has decided to produce an "experimental" plant in order to proceed with a systematic research suitable to recognize all those parameters to optimize the process and satisfy the several requests.

After some years of tests and experimentations, with many treatment temperatures with and without undervacuum cooling system, finally in 2002 REDA started the first plant supplies of 100 and 200 Hl/hour both in Italy or abroad with big satisfaction of customers for having obtained the targets that were proposed.

Since the first weeks the so obtained wines were more colored, perfumed and with a more soft and rounded taste (see comparison in the annex table).

The malolactic fermentations took place without obstacles and the whole subsequent evolution has been regular and without surprises.

The color was well-maintained contrary to what happens with other thermomaceration techniques.

The 1st target, oenologic, was therefore reached

With the new REDA's technique it was possible to obtain wines with 30/50% of total polyphenols more, 30/50% color points more (steady during time).

Other important advantages have been observed by using this application:

- The fermentation times have resulted substantially halved; 3/4 days in spite of 6/8 days by doubling virtually the production capacity of the winery and avoiding the extraction of bitter tannins and astringent typical of long fermentations. A minimum time of 3/4 days of maceration was resulted indispensable also to have a good extraction of tannins during alcoholic phase, useful to fix anthocyanins.

- With grapes note perfectly matured has been noted the elimination of the “Pyrazines” present in the skins that are responsible of the vegetable-grass taste of wine. Due to this treatment wines become more tender and without these grass-notes.
- Some tests have demonstrated that more aromatic wines could be obtained by reducing the fermentation temperature.
- With some lots of grapes, with a strong presence of botrytis, pretty good wines have been obtained thanks to the inactivation of Laccase during treatment.
- Thanks to the very soft process no lees increasement in obtained wines has been noted. Moreover all the wines obtained with this technique keep well their typicality.

The 2nd target was economic type: the new REDA’s plant has a very interesting purchase price.

It results extremely compact and ready for its application without need to be connected with boilers and refrigerator units of the customer.

REDA’s plant in fact is supplied with an own Refigerator unit – Heating pump suitable to produce both hot water or cooled water required for the process.

(Hot water is produced practically at zero cost).

The plant is also supplied with a sophisticated thermic recovery system by an auxiliary circuit of water in recirculation that involves an energetic save up to 60/70% compared to the system with only heating – cooling.

The energetic cost for the functioning of the plant is very low: about 20 euro cents for each Hl of treated must.

From a mechanical point of view a soft handling of the stemmed grapes was important in order to avoid cracking of skins (therefore only one mono pump type with low turns has been adopted to move the stemmed grapes at ambient temperature).

From an energetic point of view it has been very important to apply the thermic recovery technique to save up to 60/70% of energetic requirement.

From an engineering point of view it has been important to study an autonomous plant in energy, supplied with an own system to produce hot and cool water, ready for its use.

REDA’s plant is to be inserted il line between the crushing and fermentation tanks and it is automatized to be synchronized with the crushing.

Actually models that REDA purposes are 3:

50 – 100 – 200 Hl/h.

TAV. 1 : MERLOT Grapes - Harvest 2002 - VERONA area
WITNESS

DAY	DATE	LOT	QUALITY	620	520	420	INTENSITY	TONALITY	ANT	PFT
0°	13-set	ME023	MERLOT	0,036	0,106	0,173	0,3	1,63	58	290
1°	14-set	ME023	MERLOT	0,058	0,531	0,336	0,9	0,63	424	312
2°	15-set	ME023	MERLOT							
3°	16-set	ME023	MERLOT	0,420	3,876	1,940	6,2	0,50	560	1185
3°	16-set	ME023	MERLOT							
4°	19-set	ME023	MERLOT							
5° (draw.)	20-set	ME023	MERLOT	0,740	7,040	3,280	11,1	0,47	743	1436
	23-set	ME023	MERLOT							
	28-ott	ME023	MERLOT							
	03-dic	ME023	MERLOT	0,680	4,260	2,710	8,3	0,64	398	1580
	31-mar	ME023	MERLOT	0,700	4,640	2,860	8,2	0,62	375	1584

REDA's SYSTEM

DAY	DATE	LOT	QUALITY	620	520	420	INTENSITY	TONALITY	ANT	PFT
0°	13-set	ME024	MERLOT	0,256	2,636	1,420	4,3	0,54	391	556
1°	14-set	ME024	MERLOT	0,515	5,240	2,460	8,2	0,47	479	913
2°	15-set	ME024	MERLOT							
3°	16-set	ME024	MERLOT	0,840	6,852	3,340	11,0	0,49	766	1655
4°(draw.)	17-set	ME024	MERLOT	0,830	9,780	4,240	14,9	0,43	905	1849
	17-set	ME024	MERLOT							
	19-set	ME024	MERLOT							
	20-set	ME024	MERLOT							
	23-set	ME024	MERLOT							
	23-ott	ME024	MERLOT							
	03-dic	ME024	MERLOT	1,090	6,540	4,060	11,7	0,62	545	2055
	31-mar	ME024	MERLOT	1,040	6,700	4,030	11,8	0,60	490	2100
							+44%		+30%	+32%

ANT : Anthocyanins
PFT : Total Polyphenols

WINE COMPARISON AFTER 15 DAYS FROM DRAWING OFF OF THE WINE		
	Witness	REDA's system
COLOR	Red - rosé	Deep red - Violet
PARFUM	Fruited with herbaceous notes	Strong, like matured fruit
TASTE	Sour - Herbaceous	Soft - rounded - fruited



CONCENTRATORS

REDA

Food Processing Plants

COLD EVAPORATION CONCENTRATORS “REDA”

FOR THE SELF-ENRICHMENT OF GRAPE MUST

Introduction:

In the wine-growing regions of Central Europe, but also in the Mediterranean area, there has always been the need to use grape must enriching techniques to obtain wines with enough alcoholic volume to guarantee the minimum requisites dictated by law or production regulations.

The use of sugar or concentrates was tried to avoid for the high quality wines production by working on another side: better care on vineyards with limited productions and pruned harvests during July and August (green harvest).

If the summer season is not favorable or if there are heavy rains during harvest, the work done on the vineyards will be not enough.

By intervening with addition of sugar or concentrated must means only dilution of the product with the sole increasement of alcoholic degree while rest of the wine structure remains poor and without balance between alcohol and other components.

By intervening with concentrated musts, due to their specific characteristics of composition, can often prejudice the quality of obtained wines.

Must concentration using membranes was also tried for at least 10 years (water separation by Inverse Osmosis).

For its functioning extremely clean musts (which is difficult to obtain) should be used.

The membranes dirty very easily with an high reduction of performances after few working hours and moreover they have to be periodically replaced which translates into high costs.

If membranes with less permeoselectivity (Nanofiltration) are used, other substances escape together with water (sugars, aromas, anthocyanes, etc.).

With red musts the use of membranes is more difficult because the drain of the must (from skins) is requested and a clearness that needs several filtrations and cold precipitation processes (1-2 days).

Most of Inverse Osmosis tests have been made even on white and red wines with very doubtful results.

With white wines it has been observed that obtained wines by Inverse Osmosis are often too thin with lose of their tipicity. Wines result sometimes unbalanced, other times bitter or astringent, sometimes slightly improved.

These defects arise after some months after Osmosis treatment.

It seems that the passing of the wine through osmotic membranes cause a kind of molecular bindings break-up and not a simply filtering effect: this should justify why, after a rest period, wines so obtained change their characteristics, expecially more structurated wines.

MUST SELF-ENRICHMENT: REDA system

First of all it must be underlined that the technique is allowed in Europe.

The production of concentrated musts or the self-enrichment proceed through cold evaporation is permitted by the **art. 19 of the EC 822/87 Regulation (and new EC regulation dated 01.08.2000)**.

In a stainless steel vat, under forced vacuum, practically pure water is evaporated at a temperature of 20-24°C, leaving intact the organoleptic characteristics of the must that has been concentrated and respecting equilibrium between the various substances present in solution that will all increase proportionally to the percentage of evaporated water.

This technique has been widely applied on white and red musts.

The sugar, the acidity and the aroma forerunners come concentrate in the white must, making it possible to obtain wines that are more balanced, freshers and with more complex and intense aromas.

The research carried out on the aromatic characteristics of obtained wines with this system, has showed more than proportional increases in the whole aromatic range.

(Research carried out in the Trentino Alto Adige area on: Chardonnay - Müller Thurgau, Sauvignon - Traminer).

With red musts, concentration permits both a stronger vine extraction and an increase in sugar, which gives full, structured wines that are more riches in colour.

Reducing the liquid mass that is in contact with the skins during fermentation extracts the polyphenols, anthocyanins and tannins in a stronger but more balanced way.

The final result is not a simply increase of the alcoholic grade, but is much more complex and more favourable to obtain great red wines.

Self-enrichment through cold evaporation can be used at its best to solve different situations:

- a) The most important use is the application during harvests that are diluted by excess rains. After some days of rain the sugar level in the grapes can lower by 2-3 points (potential alcohol from 13°Alcohol to 11-11.5°Alcohol) and several sunny days with good ventilation are needed in order to return to the initial values. If grapes are matures, however, it may be very risky to wait some days. With the concentrator in your winery you can harvest immediately after the rain.
- b) Generally in southern european regions when grapes get a correct maturation the sugar is often too high while high enviromental temperatures end up to "burn" aromatic fractions and acidity. Even in this situation the concentrator is an indispensable instrument for the oenologist. He can proceed with an early harvest and retouch the must with the concentrator in order to get the correct sugar grade, while aromatic and acidity characteristics shall be exalted.

c) If we have good climatic conditions, with a good production of grapes and so with musts that are generally low in sugar and dry substance, the technique makes it possible to solve the problem by giving the possibility to evaporate up to 20% of water, improving a product that is already good.

The concentration of the must can be easily adjusted in order to have a minimum concentration (10-20% evaporated), but it can also be regulated to obtain 33-35° Bè concentrated.

The musts at the inlet, without skins and grape-seeds, don't need of further filtrations.

The concentrator can work also with musts under fermentation. The alcohol present in the must evaporates, mixed with water, and will go out combined with the evaporated.

To increase of 1° Alcohol, ex. from 12° to 13° Alcohol, 8% of water shall be evaporated.

From a tank with 100 Hl of must only 16 Hl of must shall be taken. From these 16 Hl of must 8 Hl of water will be evaporated (concentration 1:2) and the concentrated must will be returned and remixed to the balance 84 Hl.

REDA concentrators only need electric current to work. They don't use fuel or water (the functioning is through an Heater/Cooler pump).

Running costs are very low: less than 1 Euro cent for each liter of enriched must of 2° Alcohol (about 20% of evaporated water).

More than 300 REDA's concentrators have been operating for several years to the unanimous satisfaction of Clients throughout the world.

The available models are 5:

- CM50 (50 l/h evaporated at 22°C) for Wineries with 20÷80 Hl of must a day
- CM100 (100 l/h evaporated at 22°C) for wineries with 80÷150 Hl of must a day
- CM200 (200 l/h evaporated at 22°C) for wineries with 200÷300 Hl of must a day
- CM400 (400 l/h evaporated at 22°C) for wineries with 500÷1000 Hl of must a day
- CM800 (800 l/h evaporated at 22°C) for wineries with 1'000÷2'000 Hl of must a day