

WASTE MANAGEMENT AND OF THE VITICULTURAL EFFLUENTS

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The integrated oenological processes must make it possible to work out a wine of quality by minimizing the impact of the activities on the natural environment. The reflections as for the choice of the techniques, hardware or processing oenological take into account the environmental impact of the process and tend, insofar as the qualitative aspects are respected, to privilege those which consume less water and of energy and generate a minimal production of waste and effluents. This postulate being posed, the processing of the rejections remains an inevitable stage for the viticultural exploitation, as for any other human activity.

The study of matter and water flows within a cellar highlights the rejections of by-products of vinification, mainly managed in distilling, of solid waste coming for most packing and from effluents resulting from the operations from washing (cf figure 1).

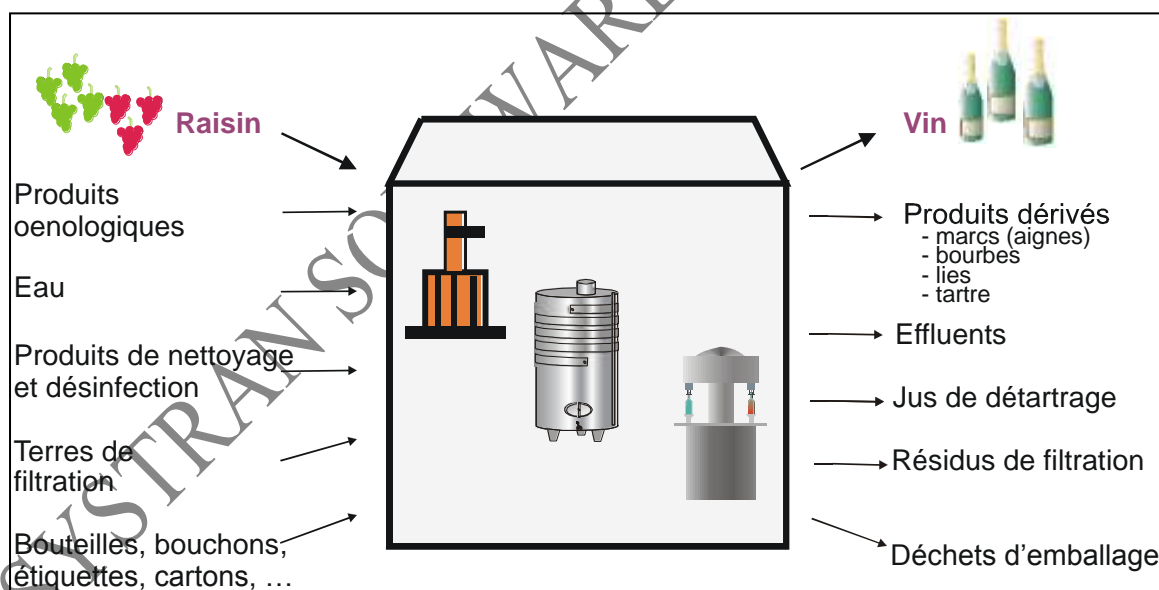


Figure 1: Inputs and outbound in a cellar

1. Waste management viticultural

1.1. Lawful obligations

• Definitions

The general legislative framework concerning waste was fixed, as well at the European level as French by 1975 (European directive of July 15th, 1975, law 75-633 of July 15th, 1975).

According To these texts, waste is defined like “any residue of a production process, of transformation or of use, any substance, material, produced or more generally any given up personal property or than its holder intend for the defection”. The effluents re-entering within the framework of a specific regulation (law on water, regulation on the installments classified for environmental protection) are not regarded as waste.

Several principles determine the policy of waste management, in Europe and France:

- the production ceiling and the incentive with the implementation of “own” technologies;
- the incentive with maximum valorization;
- the principle of the pollutant payer: in front of the law, the producer (local government agency or industrialist) is responsible for the conditions of collection, transport, elimination or recycling of his waste.

According To nature and the dangerousity, one distinguishes:

- the industrial waste banals: comparable by their composition and their mode of processing with the household refuse;
- the special industrial waste: dangerous because of their toxic nature or their property (explosive for example), they must be eliminated in specialized processing centers. The list of SAY is provided in appendix of the decree n°97-517 of May 15th, 1997; one can find there for example the reagents of laboratory, the solutions antifreeze and packing having contained them.

- **Valorization of industrial packing (DIB)**

Since 1994 (decree n°94-609 of July 13th, 1994), the cellars have the obligation to develop packing of the products which they use. For that, they can make call with a company, a collector of waste for example; this one must be approved and must draw up a contract with the viticultural operator.

Are regarded as valorization the re-employment, recycling (valorization matter) or the incineration with produced energy use (energy valorization). Except particular authorization, the burning of waste to the free air is prohibited. Starting from July 2002, the setting in discharge will be reserved for only ultimate waste (which cannot be developed under the technical requirements and economic of the moment). Right now, it should not be one destination for “industrial” packing any more.

If the cellar produces less than 1 100 liters of packing per week, it can, if he gives his consent, entrust them to the service of collection household refuse.

1.2. Nature and quantities of viticultural waste: example of Champagne

The program ECO-Field¹ made it possible to characterize the layer of waste produced during the development of champagne and to seek suitable ways of valorization. It is estimated that 18 grams of packing and 2.5 grams of residues of filtration are rejected for each worked out bottle, which respectively accounts for 4 300 and 600 tons at the level of the producing regions (cf figure 2).

¹ Etude menée entre 1999 et 2001. Le groupe de travail était constitué : ITV France, ADEME, CIVC, Agence de l’Eau Seine Normandie, Chambre d’Agriculture de la Marne, Champagnes Pommery, Tarlant, H. Blin, Nicolas Feuillatte, Cave coopérative de Nogent l’Abbesse, Coopérative des Anciens de la viticulture d’Avize.

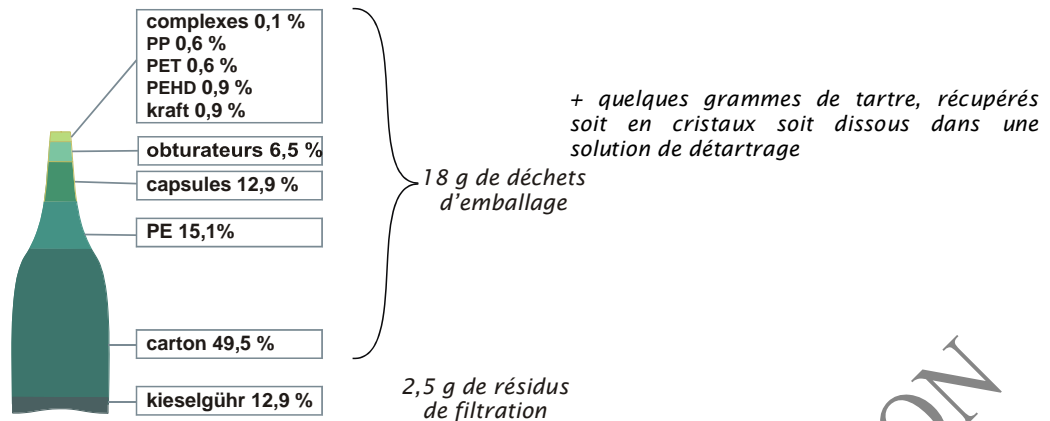


Figure 2: waste generated during making of a bottle of champagne

1.3. Management of packing

- **At the cellar**

The first principle of the valorization of waste is the organization of the sorting: packing must be separate other waste (fermentable, soiled waste, residues of filtration...) and sorted according to the selected sector.

Generally, the cellars draw up a contract with one or more collectors to define the number of buckets and the materials which they are intended to receive. To facilitate recycling, it is current to use 5 buckets (paperboards, plastics, residues of filtration, glass, thingummies and capsules (obturating)), but this number must be adapted to waste present onsite. The organization within the cellar (dustbins of color to differentiate materials, site in the workshops) and the sensitizing of permanent and temporary staff is dominating in the effectiveness of the sorting.

The service of the collector understands, in addition to the hiring of the bucket, transport, the sorting of waste (for example the separation of the various plastics) and their conditioning. The batches are then sold with the factories of recycling; the refusal of sorting can be put in discharge since they are regarded as ultimate waste.

- **Examples of collective organization**

The Natural Park of the Montagne de Reims with set up since 1984 of the operations of collection of the covers of packing of the new bottles. The collecting is carried out 3 times a year for the period of hard copy on a hundred point of collection open for the occasion in the important exploitations and the cooperatives. The staff of the Park carries out the collection of the covers to entrust them to a professional of waste who conditions them and forwards them to the treatment plants. In 2001, these are 54 tons of polyethylene which thus could be recycled.

For another waste, the capsules and the thingummies in mixture, the collection is organized in voluntary contribution. 50 specific containers are distributed on the territory of the Park. They are emptied each month by the company of reprocessing, located in the Moselle, which covers its shipping costs with the sale of the products which may undergo beneficiation (PE, aluminum).

1.4. Management of the residues of filtration

Currently, plates and cartridges of filtration do not seem which may undergo beneficiation, except by incineration (their composition prohibits composting). On the other hand, the researches undertaken on the grounds of filtration made it possible to specify two sectors of valorization.

The first stage is to collect these grounds after filtration. It is preferable that they are isolated from the effluents to protect the systems from processing downstream (stranding of the lines and the stations of raising, degradation of the pumps), but this operation often requires installations if the filter used is not with dry *débatissage* (cf figure 3).

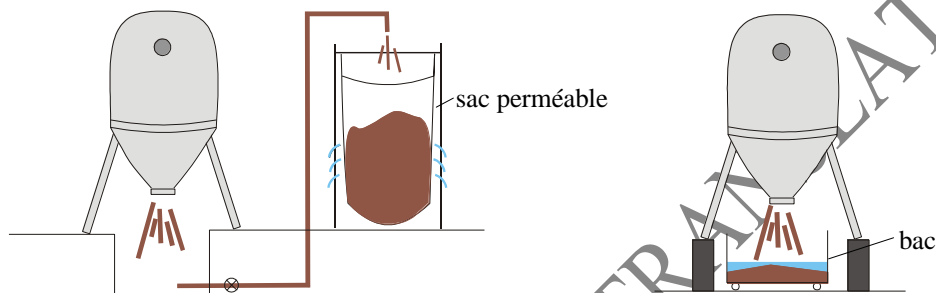


Figure 3: examples of installation to separate the grounds from surviving water

Only the grounds having filtered wines treated with the potassium ferrocyanide must be regarded as SAY and eliminated by a company approved for dangerous wastes (controlled incinerator). The others not presenting character dangerousness, are classified DIB.

- **Valorization of the tartaric acid**

Italian company CAVIRO, in partnership with FAURE, specialized in the recycling of the tartar and solutions of descaling, carries out the valorization of the tartaric acid contained in the grounds after filtration. The local partner ensures the loan of pallox provided with lid, the collection, the handing-over of a justifying document and the transport of the grounds.

This sector ECO-DIATOS is functional since the end of 2000. She admits neither the pearlites, neither the celluloses, nor the grounds having filtered wines treated with the potassium ferrocyanide. After exhaustion of the tartaric acid, the grounds are developed in mixture in compost. Another sector, currently in the course of validation, seem to be primarily set up in north and is France.

- **Agronomic Valorization of the grounds of filtration**

Analyses carried out on kieselguhr after Champagne filtration indicate contents of heavy metals very weak and largely lower than the limiting values imposed by the decree of May 3rd, 2000 (cellars subjected to authorization). On the other hand, the pH measured are weak, lower than 5.5 what can bring restrictions of amount or checks out agronomic according to the grounds.

Direct spreading is carried out by the brewery sector, with amounts varying between 17 and 77 t/ha according to the nature of waste, of the characteristics of the ground and the needs for

the cultures. The disc spreaders with conveying by chains make it possible to carry out a satisfactory spreading in spite of the compactness of the product (comparable with that which one observes with viticultural kieselguhr).

In the same way, spreaders with manure or barks could be used on vine. According To the spread amount, the contributions will be entered or not in the plan of manure. More than feasibility, it is the cost of such a practice which slows down its development today. Indeed, the purchase of such a hardware implies an investment important taking into consideration them quantities to be managed and the regrouping of several layers is delicate from a legal point of view. Lastly, as for any spreading, one should not neglect the impact which these practices can have on the image of the product and the perception of the public.

The other possibility for agronomic valorization is the Co-composting of the grounds of filtration with agro-alimentary waste or green wastes. On the lawful level, this practice, already carried out punctually, is possible since the platform of composting is authorized to receive waste of the agro-alimentary one

2. New processes of viticultural processing liquid waste

The pollution brought by the effluents of cellars being organic and primarily dissolved, the great ways of processing remain biological. The most important structures, in particular the cellars subjected to authorization (more than 20 000 hl a year) are mainly equipped. The most current processes for these cellars which have a relatively regular production of effluents, are processing continuous: activated sludge or anaerobic engine. When the climatic conditions allow it, the installment of a system of evaporation can be considered. The risk of smell pollutions should not however not be neglected.

For the cellars of less important size, one of the privileged solutions is the mixed collective processing on a communal sewage treatment plant with activated sludge. Installations, in particular the installment of a basin of storage to spread out the load of pollution and a light oversizing of the basins of ventilation and decantation are necessary. In addition, the extender of the cellars must be the object of a convention with the driver of the station. When an individual solution is put in work, the spreading, practised in the respect of the good practices, remains a true process of processing often presenting least low cost. Rustic systems can nevertheless be adapted, with the image of ventilated storage.

The innovations appeared these last years relate to the separation phase of muds, with the development of the systems of filtration and on the organization of the processing, with the appearance of collective installments.

2.1. Ventilated Storage and processing of completion

- **Recall**

This extensive process is based on the principle of covered (cf figure 4): only one tank allows ventilation then the decantation of muds, the rejection in the natural environment being carried out only after water quality quality control obtained.

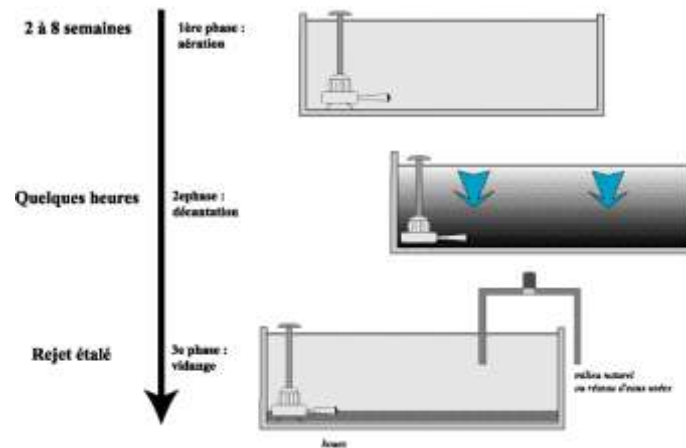


Figure 4: schematic diagram of ventilated storage

- **Evolutions of the process**

Adapted Well to the centers of pressing which produce effluents over one very limited period, this device is also used by structures of vinification which implement two tanks functioning in alternation. Certain manufacturers propose today a storage system aired out of flexible tanks; the perennality of the installments is under investigation.

The processing by ventilated storage can be supplemented by a processing of completion. The use of the sand filter now well-known and is rather largely developed. It offers an additional abatement of the DCO and a security as for the quality of the processing. Search is in hand to evaluate the interest of the use of planted filters, for example with reeds.

2.2. Use of the membranes

A new generation of processes of purification of the viticultural effluents tends to develop, associating a biological processing with a tangential filtration making it possible to separate water purified from muds. In Addition To the reduction in the DCO, the use of membranes has the advantage of being automatizable. It is developed by the manufacturers after an aired storage, in installment at the cellar or service on a mobile module. The process is also applied to a continuous system (bioreactor with membranes).

2.3. Collective ventilated Storage

To have a volume sufficient to treat, allowing for choice of a technique of powerful purification while making economies of scale, it is possible to group several cellars and to install equipment of collective processing dedicated to the only viticultural effluents.

In 1998, vine growers of the commune of Soussac (33) (680 ha, 12 suckers including 1 cooperative) chose to implement a CUMA collectively to manage the depollution of their effluents of cellars. Each wine grower set up a tank of storage corresponding to 3 days of rejection. The transport of the effluents is carried out regularly per ton with liquid manure towards a basin of ventilated storage of 3 000 m³. Muds are stored on the spot in a silo then spread on the agricultural land of the adherent wine growers.

Since the grape harvest 2000, a system comparable was set up with Vincelles (51), also organized around a CUMA. Several projects, out of Champagne and in other wine-producing areas, are in hand today.

2.4. Lawful Requirements and financial aids

The regulation imposes on each production structure which rejects effluents not to pollute the natural environment. Since the cellars are integrated into the bill of materials of the installments classified for environmental protection, of the specific texts apply and specify the limiting values of rejection authorized: decree of March 15th, 1999 for the cellars subjected to declaration, decree of May 3rd, 2000 for the cellars subjected to authorization.

In Parallel, the Agencies of Water take a royalty pollution and allot subsidies or assistances with the investment “clean” and of depollution. 2001 see the end of the 7th outline programme of the Agencies and, if it is known that the assistances will be renewed until the end of 2002, uncertainty remains as for the methods of financing after this date.

3. Conclusion

Knowledge, the control and the processing waste and effluents rejected by the cellars are indissociable integrated oenological processes. All measurements must be put in work upstream, as of the supply for example as regards packing, in order to limit to the maximum the rejections to be treated and to control the inherent costs.

Today, the organization of the sectors of valorization forces the cellars to pass via the collectors of waste which gathers and reconditions to fulfill the requirements of supply of the factories of recycling. A regrouping, a collective organization, could make it possible to rationalize the operations and to make economies of scale.

If this tendency takes shape in the field of the viticultural liquid waste processing, it is more difficult to set up as regards waste management solids. Without to change trade and to become “caterers of waste”, the wine professionals will find an interest to imply itself on these topics by the development of technical solutions or systems of organization answering the best possible one the specific constraints of the sector.