

**AGRICULTURAL SPREADING WINERIES
WASTEWATER**

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SUMMARY

Spreading on agricultural land of the viticultural effluents is often used in many wine-producing areas, for reasons related to the simplicity of the technique compared to the other processes of purification.

The viticultural rejections, primarily made up of organic matters present a good aptitude for recycling by agricultural spreading, nevertheless, the placement of this sector must respect certain principles to ensure an optimal management of the effluents: adaptation of the hardware and procedures of washing in the cellar, study of perimeter of spreading, agronomic follow-up and book of spreading.

Two techniques of spreading are classically employed: sprinkling by gun and the use of cistern of spreading of the type thunder with liquid manure. The choice of the technique of spreading depends closely on the importance and the geographical location of the cellar.

I - INTRODUCTION

The optimal management of hygiene in the cellars is a permanent preoccupation of the elaborative ones. The waste waters which results from it represent a primarily organic source of pollution. It is related to the principal compounds of musts and the wines (acid, alcohol, compounds phenolic etc).

With the image of many effluents of the food industry, the viticultural effluents are classified among waste water which may undergo beneficiation by agricultural spreading.

This process of recycling, simple of the first access requires actually a very detailed attention during its execution and of its follow-up in order to ensure the perennality of the technique and to avoid any rollout of pollution towards surface water, even the groundwaters.

II - Principle of an agricultural spreading

The principle of the agricultural spreading of organic effluents rests on the capacitance of purification of a system complexes made up of the ground, micro-organisms and plants. It associates a capacity of filtration, the absorbing properties and the biological complex related to the micro-organisms which ends in a degradation of the organic matter in assimilable compounds by the plants.

Spreading under hears thus, export by the plants in place of the elements brought by the viticultural effluents. So the ground on which spreading takes place must be exploited with an adapted culture and farming methods which take into account the fertilizing contributions related to the effluents.

In addition, the technique used and the conditions of its application directly will condition the “quality” of spreading. For the cellars, a preliminary reflection on the strategy of spreading must make it possible to highlight the whole of these points and to direct its choice towards the two principal techniques available:

- The mobile spreading of type thunders with liquid manure;
- Spreading by gun sprinkler of the type fixed or mobile.

III - OPÉRATIONS PRECONDITIONS TO SPREADING

3.1 Characterization of the effluents

The characteristic of the viticultural effluents is closely related to the policy of water management within the cellar. The viticultural effluents are with the image of the wines, rich in potassium and low in nitrogen and cogitates. .

	Manure Equivalent in Kg for 100 m3 of effluents		
	NR total	P2O5	K2O
Viticultural Effluents	4 (6 to 18)	4 (3 to 21)	35 (45 to 165)
Viticultural Effluents + Muds	6 (1.5 to 10)	5 (1 to 11)	43 (10 to 76)
Muds alone	70	60	400

Source: Chamber of Agriculture of the Marne

Table1: Median values of the contribution of fertilizing elements

The variations of composition exist for all the parameters, thus extremely important heavy metals, elements when it is considered a recycling in agriculture, undergo also variations. However, on the level of the viticultural effluents the thresholds are always much lower than the values retained by standard NF U 44,0411. It should be noted that this standard does not relate to the viticultural effluents directly, but it is often used as reference frame since there is a viticultural mud spreading of effluents. Table2Indicates some examples of measurements of metals on viticultural effluents and viticultural muds of effluents compared to standard NF U 44,041. The values are low, and the risk of an incident related to heavy metals is of this extremely limited fact.

Measurements out of Mg per Kg of dry matters	1* Example	2* Example	Example 3 **	Example 4 **	Normalizes NF U 44,041

¹ NF U 44.041 : Norme Française de juillet 1985 qui s'applique pour l'épandage des boues des ouvrages de traitement des eaux usées urbaines

Zn	238	170	-	-	3,000
Cr	38	33	78	60	1,000
Cu	140	60	590	476	2,000
Pb	41	30	109	98	800
Ni	12	18	35	32	200
	-	-	5	5.2	100
Cd	1.1	1.5	2	1.8	20
Hg	-	-	<1	0.4	4,000

* Examples 1 and 2: measurements on viticultural effluents of pressing

** Examples 2 and 3: measurements on viticultural muds of effluents

Table2: Contents of metals of the viticultural effluents

3.2 Internal Measurements at the cellar

It is at least necessary to separate waste water and rain waters the networks. In the same way, the cooling or surface waters must be deviated moreover waste waters.

Internal measurements must also make it possible to reduce the water consumption without carrying damage to hygiene. Installations relate to in particular the following aspects:

- installation of system of washing to automatic stop;
- use of suppressors;
- tweaking of the nettoyability (ground, tanks);
- adapted choices of dipositifs of flow.

The choice of the products of cleaning must take into account agricultural spreading, opposite in particular of their biodegradability. Concerning descaling, recycling in industry of the natural tartaric acid of the alkaline solutions is desirable, in particular for the important cellars.

In addition, the regular statements of the water meters will be able to allow an easier dimensioning of the installment of spreading.

3.3 Prior study

The aim of the study spreading is to determine the aptitude of the agricultural pieces to receive this kind of effluent and to provide the practical methods of application.

Several points are necessarily studied:

The characterization of the cellar

A qualitative and quantitative appreciation of the effluents is necessary in order to define which type of effluent is generated. Taking into account variability in water consumption, it is desirable to carry out regular measurements in order to evaluate the needs for the various stages for the development.

Environmental Constraints of the medium

This part of the study, qualified “of study of perimeter” is very important since it constitutes the base of the feasibility of spreading. The study must comprise a plan of the pieces with their aptitude for spreading according to the context geographical, pedological, hydrogeologic and climatic of the selected grounds.

Recommendation, aspects practical

It is the synthetic part of the study which constitutes the specifications for the project superintendent of spreading. The bases of these recommendations rest on the whole of the above mentioned investigations and the knowledge of the practices of the farmers. The study specifies in particular the permissible amounts, the frequency of spreadings and the periods recommended and/or authorized.

Consultings on the practice of spreading even can be to him also formulated: fixed or mobile spreading.

IV - IMPLEMENTATION OF SPREADING

The good organization of the building site of spreading allows an optimal realization of this technique. Its general unfolding is as follows:

- Stage 1: cleaning of the viticultural effluents
- Stage 2: storage in a tank buffer whose capacitance is variable according to the cellar concerned (localization, volume of activity and aspects lawful).
- Stage 3: spreading by cistern, fixed or mobile gun

5.1 Cleaning of the effluents

Cleaning is an operation carried out downstream from the building drain of the effluents. The objective of this stage is to avoid the passage of coarse elements in the lines and the pumps to prevent the deterioration of this hardware.

Although it is not essential during a spreading per ton with liquid manure, cleaning remains strongly advised. However, it is essential, in the case of a spreading by gun sprinkler, to have a system of powerful cleaning, in particular to avoid the risk of filling of the tube and the deterioration of the pump of pressurization.

Several types of screen cleaners exist, however the basic principle remains the same one, it is operated of a simple sifting a grid with gauged pores. The diameter generally retained within the framework of the viticultural effluents is about a millimetre.

5.2 Storage of the effluents

The average ratios of consumption are about 30 to 150 liters of water per hectolitre of worked out wine, but there really does not exist of reliable ratio. It is consequently preferable to determine the bases of its water consumption for the viticultural activity. Generally, the important point of use of water in the cellars is the period of the grape harvest. The storage of the effluents will have to be of an important level sufficient for:

- to respect the regulation of the classified installments²;
- to put itself safe from any climatic and technical problem;
- to free itself from impossibilities of spreading at certain periods of the year.

A special attention must be carried compared to the problem of odors, with the risk of explosion related to the possible formation of methane and with the acid attack of the effluents lived tank of storage (cement, steel, aluminum etc).

5.3 spreading by cistern

Technique simple to implement, spreading by cistern is largely used in all the wine-producing areas. Its implementation requires a good organization, especially during the periods of grape harvest. Often, the service providers who are generally farmers, offer their service in order to discharge the cellars from the organisational aspects.

Among the whole of the cisterns of spreading available on the market, the selection criteria will ultimately be guided by the work conditions and of exploitation: volume to be spread; the accessibility of the stock room of the effluents; the power of the farm tractor, are stem cells in the choice of the size of the cistern. The quality of

² arrêté du 1^{er} mars 1993 relatif aux prélèvements et à la consommation d'eau ainsi qu'aux rejets de toute nature des installations classées pour la protection de l'environnement soumises à autorisation

completion of the work, the flexibility and the comfort of use, are other elements of choices which with volume of equal cistern will strongly influence the hardware costs. Indeed, most manufacturers propose a basic hardware with the possibility of carrying out installations specific, clean to each user. The most notable equipment is:

- the pneumatic tyres low pressure which respect the integrity of the ground best;
- the remote opening of the valve of spreading;
- the antacid lining (the effluents are primarily acid);

54 spreading by gun

Whatever the system selected, the gun sprinkler must allow a good cover of the piece, with a good distribution on the ground of the effluent. This kind of spreading can be declined in two configurations: the fixed gun or the mobile automatic roller gun (standard irrigation).

In all the cases, it is necessary to set up after cleaning:

- a pump of special pressurization “liquidates charged”, equipped with security in order to prevent a lack of effluent;
- a system of accounting of spread volumes;
- a network of fixed lines buried or not, with multipoint possibilities of branch to ensure the easy displacement of the sprinkler;
- one or more guns sprinklers according to the size of the building site of spreading.

The elements of choice of the winding gun are dependant on the localization of the cellar and its volume of activity. It should be noted that for important building sites of spreading (several thousands of m3), a configuration with multiple fixed guns would be appropriate better. For the small installments the automatic roller gun brings a good satisfaction in spite of the constraint related to the obligatory redeployment of the sprinkler.

Spreading	Advantages	Disadvantages
Mobile by cistern	<ul style="list-style-type: none"> • possibility of spreading on remote grounds of the cellar; • possibility of using the services of a person receiving benefits; • weak investment; 	<ul style="list-style-type: none"> • important costs of operation (manpower); • climatic uncertainty requiring a storage consequently; • sometimes difficult uniform

	<ul style="list-style-type: none"> • simplicity of implementation and flexibility in use 	distribution
Fix by gun	<ul style="list-style-type: none"> • low costs of operation; • little manpower necessary; • possibility of automation; • homogeneous distribution of the effluent 	<ul style="list-style-type: none"> • important investment (cleaning, lines fixed...); • require the proximity of grounds suited to spreading; • monitoring of the building site with ensured in a daily way

Table3: Comparison of the two techniques of spreading

VI - MANAGEMENT AND FOLLOWED BY SPREADINGS

A good management of the building site of spreading is essential, it to make it possible moreover to ensure the perennality of this technique. The objective is to ensure the most uniform possible distribution effluents, by respecting the practical recommendations mentioned in the prior study, namely the spread amount, and the frequency of contribution. Moreover, it is especially advisable to avoid any streaming of effluent.

If necessary, a good communication is necessary between the person who receives the effluents on her grounds and the cellar in order to harmonize the control of the building site of spreading according to the cultivation methods of the farmer.

6.1 The book of spreading

It represents essential tools with the follow-up of spreading. This book archives, must comprise for each spreading, the date, volume, sprinkled surface, the piece concerned and its cadastral references, the nature of the effluent and the culture in place. It can be also amended various annotations such as the possible encountered engineering problems.

This document is systematically required by the agencies of water within the framework of the attribution of the bonus for purification.

6.2 The agronomic follow-up

It is not systematic, because it depends on the size of the building site of spreading. It is a study generally required by the agencies of water. The agronomic follow-up constitutes an inventory of fixtures of the pieces receiving the effluents. It generally presents the follow-up of the productions in place and the analysis of the

spreading campaign with a summary of the total amounts brought by piece into comparative of the recommendations made at the time of the prior study.

VII - CONCLUSION

In comparison with other types of effluents resulting from the food industry, the viticultural effluents do not pose problems with respect to the nitrogen which requires a very pointed management for the calculation of the fertilization of the pieces. In the same way, the problems involved in heavy metals do not relate to this kind of effluents directly. However the management of the viticultural effluents is very related to the practices of wine hygiene. the use of certain oenological products for the processing of the wines must be carried out in good harmony with the sector of recycling in agriculture.

Vigilance and the rigor on behalf of all are necessary in order to preserve this simple and interesting technique that recycling in agriculture of the viticultural effluents represents.