

EXPERIMENTATION CONSTRUCTED WETLANDS WITH ZEOLITE FOR WINE WASTERWATER TREATMENT : ZEOFITO™

Joël ROCHARD et Sébastien KERNER(1); Darlo MARENGO(2),

(1) Institut Français de la Vigne et du Vin
Pôle environnement durable
17 rue Jean Chandon Moët – BP 20046
51202 Epernay cedex
Tél. 03 26 51 50 90 – Fax. 03 26 51 50 89
Mail : joel.rochard@vignevin.com

(2) Amethyst srl
C.so Cortemilia 108
12051 Alba (CN) – Italie
Tél. +39 (011) 4371693
Mail : dario.marengo@coringegneria.it

Abstract

World-wide, the use of constructed wetlands is considered to be the cheapest alternative for the purification of cellar wastewater. Constructed subsurface wetlands are used to treat the cellars effluents: they performed very well as a secondary treatment system, down-stream a stilling pool and a hydroseparator Imhoff. The winery Podere Ruggeri Corsini that uses a subsurface constructed wetland has been investigated into the practical implementation of the **active purification system**, as well as obtaining the latest research results regarding wastewater treatment. The object of this patented system is to increase the purification capacity of S.F.S. phytopurification systems, permitting a reduction in the treatment areas required to produce effluents conforming to the regulations in force.

The benefits of using constructed wetland for winery wastewater treatment include low costs of installation and maintenance, scalability depending on cellar dimensions and/or its growth, and on effective management. A wetland is a biological filter and like all filters requires some occasional cleaning and maintenance.

Keywords: constructed wetlands, zeolite, mycorrhizated plants, wine wastewater

Operating principle

The ZEOFITO™ disposal offers a real new approach for the treatment of winery wastewater and has been explored for such applications (ex. Podere Ruggeri Corsini located in Monforte d'Alba).

The ZEOFITO™ disposal is an S.F.S. (subsurface horizontal flow) **active purification system** waterproofed by a layer of EPDM, geomembrane which does not require any special protection against weather conditions. The waterproofed tanks are filled in with an inert material named zeolitite, rock of volcanic origin containing a quantity of natural zeolite in the range 20÷90%. Its large specific surface (200÷500 m²/g) is particularly advantageous for the use of zeolitites as filling materials in phytopurification systems, since it permits greater growth and multiplications of the micro-organisms responsible for the organic-material degradation processes. Moreover, by virtue of the high cations-exchange capacity, characteristic of zeolite, these minerals absorb cations of various kind from the pollutant effluents and retain them within their own structure, allowing the water purified to flow

Moreover, in a particularly preferred embodiment of the **active phytopurification system**, the emerged, rooted macrophytes used by the ZEOFITO™ disposal are mycorrhizated plants. This use has further specific advantages connected with increased root mass and an increased ability of the roots to probe the ground. It has been observed that the presence of mycorrhizae increases oxygen transfer from the aerial portion to the submerged, thus strengthening the biochemical processes which take place in the rhizosphere.

In other words, the **active phytopurification system** allows to achieve a reduction of the treatment area require per equivalent inhabitant to less than 1/3 and with twice the flow-rate of water.

Materials and methods

Effluent sampling and analysis: last year, effluent samples were collected from different points before and after the constructed wetland of Poderi Ruggeri Corsini with the following results:

TEST	UM	Before ZEOFITO™ 2008/09/10 average	After ZEOFITO™ 2008/09/17 average	Allowance %
pH		4,08	7,16	43
SST	mg/l	290	62	78,6
COD	mg/l	10.100	84	99,2
BOD ₅	mg/l	5.900	55	99,1
Ammonia nitrogen	mg/l	68,1	1,4	97,9

The performance meets the standards of discharges

This year, samples will be collected over two months period, during the vintage and following processing, from different sampling points before and after stilling pool, before and after hydroseparator Imhoff, before and after constructed wetland, taking in account the retention time and measuring the flow-rate. The sample will be analyzed for pH and COD each day, and, during this peak period, five times for pH, TSS (Total Suspended Solid), COD (Chemical Oxygen Demand), BOD₅ (Biochemical Oxygen Demand), Heavy Metals, Nitrate.

Expected results

Reduction of treatment area required

Effluents quality conforms to the regulations in force, clean enough to be used for irrigation

Conclusions

No use of energy (zero CO₂ emissions)

The benefits of using this system for winery wastewater purification include low costs, aesthetic wastewater treatment system end low maintenance

The ZEOFITO™ disposal should be seen as a secondary treatment system, since the removal of solids is essential before effluent enters the wetland system

The maintenance can be performed by unskilled personnel

Plants have to be cut down once or twice per year

Bad odours elimination

No irritating insects