



Study visit at olive oil mills in Italy

December 14 - 16, 2011

■ Olive sector and the olive mill wastewater

In order to foster the innovation in the olive mill sector, cleantech companies, R&D providers, technology developers are invited to participate in the study tour with the aim of exchange expertise, establish interesting new contacts at European level and learn about the latest trends in olive mill wastewater treatment in Italy.

The two and half day program includes visits to the olive mills and to three demonstration plants for OMW treatment and reuse.

■ Study visit agenda

14 December

- 14.00 Pick up at the Hotel Michelangelo (Terni, Italy)
- 14.30 Visit to the OMW phytoremediation plant (Castel di Lago – Terni)
- 16.00 Visit to traditional (press), 2 and 3-phase mills
- 18.00 Oleico+ workshop - European awareness raising campaign for an environmental sustainable olive mill waste management (IT,ES,PT and GR)

15 December

- 08.00 Travel from Terni to Oleifici Mataluni - Montesarchio (Benevento)
- 12.00 Visit to the factory and to the demonstration plant for recovering antioxidants and water
- 16.00 Travel to Parco del Cilento (Salerno)

16 December

- 09.00 Visit to the composting TIRSAV plant – Parco del Cilento (Salerno)

Friday afternoon: drop-off in Rome

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In collaboration with LIFE+ projects
Oleico+, RE-WASTE and TIRSAV+.



■ Olive sector and the Olive Mill Wastewater (OMW)

The European Union dominates the international olive oil market by growing more than 70% of the world's olive. Spain, with 2.47 million ha, has the largest area under cultivation, followed by Italy (1.16 million ha), Greece (0.81 million ha) and Portugal (0.38 million ha).

Three different methods are currently used to extract oil from olives:

- Traditional methods, combining stone milling and mechanical – pressing techniques;
- 3-phase decanter process, based on a horizontal centrifuge technology and involving an additional vertical centrifuge phase
- 2-phase decanter process, based on a horizontal centrifuge system used to separate and extract the olive oil.

Each of them generates different amounts and types of residues, all of which are potentially hazardous to the environment. In particular, the wastewater (OMW) produced from traditional and 3-phase processing methods represents a key environmental problem in Mediterranean areas.

The OMW appears like a brownish solution comprising olive vegetation water, washing water, pulp particles and residual oil, characterized by low pH, high BOD5 and COD loads and phytotoxic levels of phenolic compounds. Because of the huge quantities generated from November to March, comprised between 10 and 30 Mm3 per year, the OMW represents a waste management problem in olive oil producing countries. Despite a wide number of chemical and biological technologies reported in literature, the disposal of OMW is still predominantly carried out via land spreading or by means of evaporation ponds.

In Italy, the oil industrial sector comprises about 6,300 oil mills, mostly located in Southern Italy, 46% of which is using the traditional pressing, 43% the three-phase technology and 11% the two-phase technology. The average amount of olives processed per mill is 500 tons. The Italian olive oil industry is constituted by a great multitude of small transformation plants, often located on the hills or in the countryside, without modern infrastructures. The man power employed in each mill is of about 2-3 workers and the average amount of olives processed per mill is 500 tons.

■ ISRIM - OMW phytoremediation plant

The plant is a waterproofing basin (reservoir) that consists of two parts, the lower for the OMW storage and the upper for the trees growth. A subsurface irrigation system is realised in order to collect the OMW at the root level. The OMW is introduced into the plant in wintertime when is subject to a first microbial attack, which causes a partial degradation of the organic load. During spring and summer, the OMW is pumped to the root level by a pipeline and is either metabolised by specialized rhizosphere community or evapotranspired by selected trees. In September, the plant is usually completely empty and the wastewater totally detoxified and evaporated. Both toxic and organic substances present in the OMWW are degraded via rhizoremediation with undetectable alteration of soil parameters. (Euro. patent n. 1216963). www.lifeoleico.it



Terni

■ Industria Oleifici Mataluni srl, Filtration system for recovering antioxidants and water

The process involves four steps. The pre-treatment aims to reduce the content of suspended solids and fats in the OMWW, in order to increase its permeability during the tangential flow filtration and to reduce the membrane fouling. After the pre-treatment stage, the waste is subjected to three consecutive steps of tangential flow filtration (ultra-filtration, nano-filtration and reverse osmosis) within a spiral wound polymeric membrane. The fraction containing poly-phenolic compounds, which are present in large amount in the OMWW, is purified through adsorbent resins, obtaining a concentrated phenolic extract with different biological properties. Finally, anaerobic digestion of the organic fractions is used to produce biogas for renewable electricity and heat generation. Website: www.re-wasteproject.it



**Montesarchio,
Benevento**

■ Ente Parco Nazionale del Cilento e Vallo di Diano Composting system: LIFE Project Tirsav and Tirsav+

The process aims to reclaim OMWW for agronomical purpose (OMWW and wet pomaces) through a located in situ biostabilization process (TIRSAV) or through composting in a centralized plant (TIRSAV+). In the TIRSAV system the procedure occurs at the milling level by mixing Olive Mill Waste Effluents (OMWEs), previously pitted, with raw hygroscopic bulking agents (straw, wool waste, sawdust, olive leaves, twigs and pruning) in order to obtain a less humid non percolating and non bad-smelling Olive Mill Waste Mixture (OMWM) which is directly packaged into 20-30 kg net bags, hence resulting easy to be managed.



**Laurino,
Salerno**

The centralized technology (TIRSAV+) is based on a 90 days composting process, developed in several stages: i) storage; ii) primary and secondary mixing; iii) A.C.T. (active composting time) or accelerated bio-oxidation; iv) ageing by blowing; v) refining; vi) packaging. The final product is packed and is ready for the market. www.tirsavplus.eu.