

OLIVE WASTEWATER MANAGEMENT



ITALIAN AGENCY
FOR DEVELOPMENT
COOPERATION



CIHEAM
BARI

1. OLIVE BYPRODUCTS

The extraction of olive oil is a seasonal operation which is a typical agro-industrial activity in the Mediterranean Region whereas is new for Pakistan. The Olive oil extraction process usually yields three main products:



| Olive oil (12-22%);



| Husks or pomace (solid by-products 30%);



| Olive mill wastewater (OMW or vegetable water, 40-50%).



2. THE HUSK (POMACE)

- The husk is the residual olive paste left after processing, containing skins, pulp and pit fragments.
- Relative percentages of water and oil in the husks depend on the pressing technology applied, traditional mill, two-phase or three-phase centrifugation, and on various environmental and agronomic parameters.
- Husks are usually used by the oil extraction industry to obtain crude olive-pomace oil or they can be used as a matrix to produce compost.



3. THE OLIVE MILL WASTEWATER

- The olive mill wastewater represents the water contained in the olives and the water added during the oil processing.
- It is a brown liquid suspension separated from the oil by centrifugation or sedimentation after pressing.
- It usually shows a pH between 4.8 and 5.5 and contains valuable amounts of nutrients, such as potassium and phosphorus, trace elements, polyphenolic compounds, as well as several other organic compounds.

- Olive oil mill wastewaters usually show an enormous agronomic value. In fact, a volume of 50m³ (traditional mills) or 80m³ (3-phase mill) of OMW, allowed to be spread in 1 Hectare of olive orchards, contains approximately:
- 70-90 kg of N,
- 80-170 kg of K,
- 20-30 kg of P,
- 3600-4000 kg of organic matter



4. POLLUTION PROBLEM

- Olive mill wastewater is usually discharged directly into sewage systems, water streams and occasional dumping sites or concentrated in lagoons and pools due to the current lack of appropriate alternative technologies to treat or recycle them properly.
- The organic compounds dissolved and/or suspended into the OMW may result in serious problems if dumped directly into groundwater (e.g. aquifers, wells), discharged in superficial waters (e.g. rivers, springs) or percolated through the soil.
- The polluting effect is actually due to the large biological and chemical oxygen demand and the high content of phenolic compounds, tannins and additional molecules (microbial growth-inhibiting compounds).
- In addition, high doses of OMW can increase soil salinity.

5. DIFFERENCE BETWEEN BYPRODUCTS FROM TRADITIONAL AND MODERN MILLS

- Modern mills with continuous extraction systems require the addition of water during the extraction process and generate more diluted wastewater in comparison with traditional mills (5-10% of residual dry matter with continuous extraction system versus 10-17% for traditional mills).
- The quantity of olive mill wastewater generated during the oil extraction varies according to the technology applied to the process:

IN TRADITIONAL MILLS: 40 to 60 liter/100 kg of olives

IN MODERN MILLS: 50 to 90 liter/100 kg of olives

- Traditional (batch) and modern (3-phase) production processes produce significant amounts of black water and olive husks with low water content.
- On the other hand, 2-phase production processes do not produce black water but only olive husks with high water content.
- The same amount of residual dry matter in the wastewater coming from modern mills is contained in larger volumes than the one coming from traditional mills.

6. APPLICATION OF OMW

- Olive oil mill wastewater applied to the soil at the recommended doses can perform as fertilizer without negative effects on the soil properties and functions.
- Wastewater can be added directly to the soil during the winter season with no concern for soil moisture content and plant water needs and with a positive contribution to soil fertility.

Essential good practices for an appropriate soil distribution are:

Uniform superficial soil distribution with a safety distance of 50-70cm from tree trunks;

- Two weeks (15 days) of air oxidation.
- Soil incorporation at 15-20cm with superficial and light tillage;

FOR FRUIT TREES: in winter, spread in the orchard in a row, respecting a 50-70cm distance from the trunk.

FOR FIELD CROPS: 2 to 3 months before cultivation, in any case, avoiding foliar distribution;

FOR VEGETABLES: at least one month before planting.

Olive oil mill wastewater can be distributed into the soil directly from the tank or through a piping system forcing a uniform distribution in the field across and along the plant rows.



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