CHARACTERISTICS OF THREE-PHASE CONTINUOUS CENTRIFUGATION PROCESS FOR OLIVE OIL EXTRACTION

- This process yields three phases:
  - Oily phase (20%)
  - Solid residue (30%): olive pulp, stones
  - Aqueous phase (50%): Water content of fruits + process water OMWW

- Process steps:
  1. Olive washing
  2. Milling and beating
  3. Horizontal centrifugation: In this step is used a significantly amount of hot water to wash the oil. Separation of solid residue (olive cake) from the other two liquid phases in the decanter. These liquid phases are submitted to the next step:
  4. Vertical centrifugation: Separation of olive oil from OMWW

- Advantages compared with the traditional press olive oil extraction.
  - It requires less human labour
  - It has higher olive oil production rates.

- Disadvantages
  - Increased water utilization (1.25 to 1.75 times more water)
  - Higher energy requirements
  - Loss of valuable components of oil (natural antioxidants)
  - Problems of disposal of the wastewater.

CHARACTERISTICS OF TWO-PHASE CONTINUOUS CENTRIFUGATION PROCESS FOR OLIVE OIL EXTRACTION

- This process yields two phases:
  - Oil as liquid phase
  - Very wet olive cake (TPOMW) as solid phase.

- Process steps
  - Olive washing
  - Milling and beating
  - Horizontal centrifugation without addition of water:
    1. Solid phase (TPOMW-wet olive cake)
    2. Liquid phase
  - Oil washing/Vertical centrifugation:
    1. Waste water
    2. Olive oil

- Advantages compared with the three-phase continuous centrifugation process
  - The construction of two-phase centrifuges is less complicated
  - More reliable and less expensive than the three-phase decanter.
  - Less use of water
  - Less use of energy
  - Higher quality of oil produced: higher oxidation stability and better organoleptic characteristics.

- Disadvantages
  - Production of a semi-solid waste requiring disposal.
  - The composting of this semi-solid waste (TPOMW-“alpeorujo”) is difficult.
  - TPOMW has a high moisture content (55-70%), sugars, and fine solids which give this waste a doughty consistency and make transport, storage and handling difficult. Accumulated in large evaporation ponds.
  - More concentrated in fats, dry residues, phenols and o-diphenols than OMWW
  - COD and turbidity are also higher.