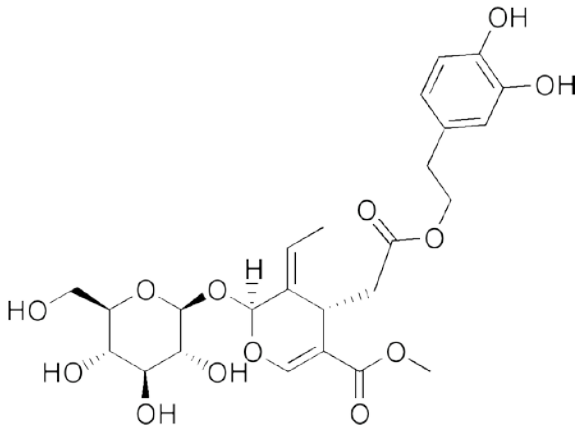
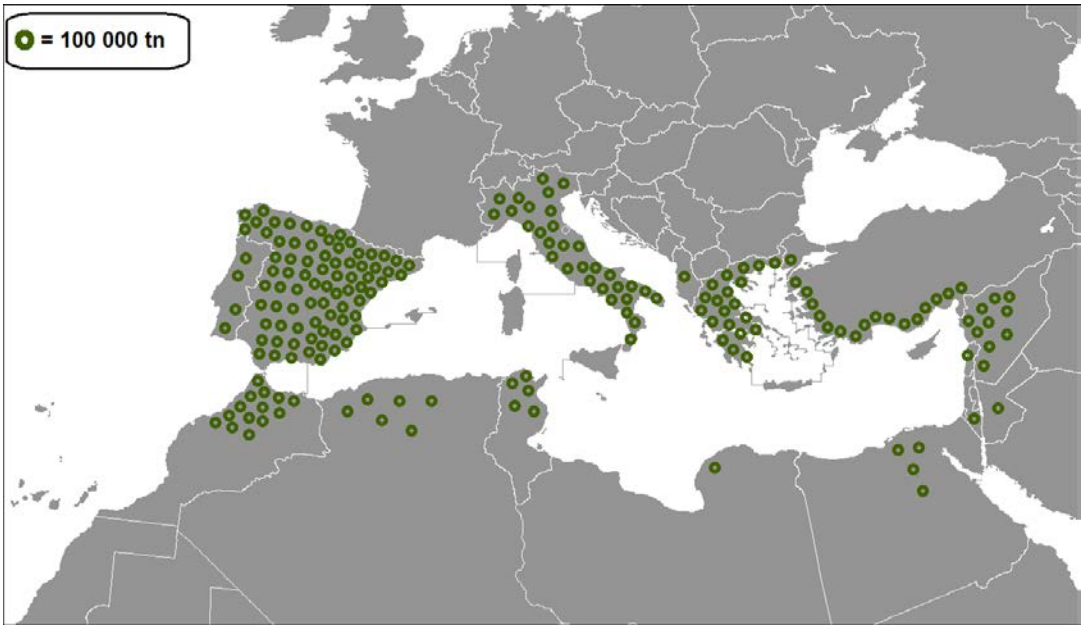
Olive Oil

Olives:

- Olives are harvested in late September through early January
- Olives are not collected off the ground – leads to poor taste because of damage to the fruit.
- Colors
    - Green – picked when the fruit is full size, but before ripening begins (Sept – October)
    - Black – fully matured and fully ripened (November – December)
- Taste – raw olives are VERY bitter
    - Oleuropein (oh-lur-uh-pee-in) and other bitter phenolic compounds reach 14-15% of dry weight of olives – unpalatable



        - Concentration decreases as the fruit ripens
        - Curing can also promote conversion to other organic compounds
    - Curing process:
        - "Spanish Type" - Using Lye (sodium hydroxide) – nearly 60% of table olives are produced this way (this is what you are eating when you buy canned black olives in the store)
            - Olive is soaked in a weak solution of NaOH.
            - NaOH penetrates the fruit.
            - OH^- hydrolyzes the ester bond of Oleuropein (circled above).
            - The concentration of OH^- decreases and the solution eventually becomes neutral.
            - Olives are washed to remove excess NaOH
            - Soaked in brine where fermentation occurs (see below)
        - "Greek or Sicilian Type" - Using only brine – curing can take several months
            - Fermentation naturally occurs because of the bacteria on the surface of the olive.
                - Oleuropein and other bitter organics are leached out and metabolized by the bacteria
                - Bacteria produce other desirable products including organic acids, probiotics, and glycerol –
                    - these influence the smell and taste of the final product.
                    - Lactic acid is especially important because it make the solution more acidic which prevents the growth of dangerous pathogenic bacteria.
- Production by country:
    - Spain > Italy (by about 2x) > Greece > Turkey > others (See map)



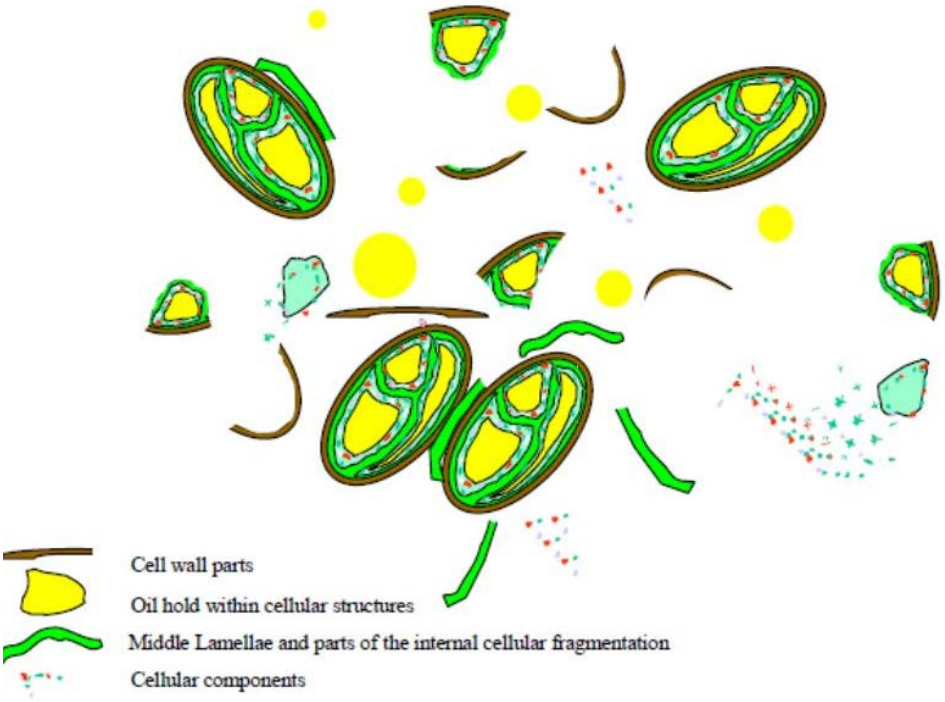
- Nutritional properties of olives:

Nutrition Facts
Olives, small

Amount Per 100 grams			
Calories 115			
			% Daily Value*
Total Fat 11 g			16%
Saturated fat 1.4 g			7%
Polyunsaturated fat 0.9 g			
Monounsaturated fat 8 g			
Cholesterol 0 mg			0%
Sodium 735 mg			30%
Potassium 8 mg			0%
Total Carbohydrate 6 g			2%
Dietary fiber 3.2 g			12%
Sugar 0 g			
Protein 0.8 g			1%
Vitamin A	8%	Vitamin C	1%
Calcium	8%	Iron	18%
Vitamin D	0%	Vitamin B-6	0%
Vitamin B-12	0%	Magnesium	1%

- Types of fatty acids:
  - Oleic acid (18:1 n-9) = 55-83% of oil
  - Linoleic (18:2 n-6) = 3.5-21%
  - Linolenic (18:3 n-3) = 1 - 1.5%
  - Saturated fatty acids = 8 - 20%

  - Triglycerides!



- Making olive oil
  - Extraction – break apart cell and release the oil
    - Olive presses – still most common way
      - First way of extraction (began over 5000 years ago by Greeks) – mill and press were in one step
      - Pressure is applied to an produce an olive paste
        - This is the milling process
      - The paste is then put into a press where the oil and natural water is slowly worked out of the solid material
        - HUGE pressures are applied (up to 400 atm!)
      - Cleanliness is important – leftover paste will begin to ferment and make poor flavor in the next batch
  - Decantation – separation of oil from water and other cellular debris
    - Tradition method = add water and let oil rise to the top
    - Contemporary method = centrifugation
    - Sinolea method
      - metal plates are dipped into the paste.
      - Oil sticks to the plates better than the cellular water.
      - Oil is harvested by scraping off plates
- "Cold-pressed" is a common way that olive oil is market:
  - Cold – no heat added during extraction
    - This is good because heat promotes oxidation of the oils and evaporation of beneficial organic molecules that contribute to the smell of the oil.
    - EU requires the temperature to be below 80 °F
    - High temperatures will increase the yield.
  - Pressed – olives crushed in a mill to extract the oil.

- Olive Oil Grades:
  - Based on extraction process and oleic acid (18:1 n-9) content
  - Refined oil:
    - Processed to remove impurities
      - Heat or chemical treatment
    - Little or no olive aroma, flavor, color, or bitterness
    - Lack antioxidants and anti-inflammatories that make olive oil stand out as a desirable food
  - Unrefined oil:
    - Unprocessed by heat or chemical treatments
  - Extra Virgin
    - **Unrefined**
    - Retains true olive taste
    - Low level of free oleic acid (remember that oil is packaged as triglycerides)
      - No more that 1% free oleic acid
    - Golden green color
    - Light peppery taste
  - Virgin
    - Also **unrefined**
    - Production standards are not as rigid as extra virgin
    - Higher free oleic acid content
    - Less intense flavor
    - Rarely found in stores
  - Pure
    - Blend of virgin and **refined**.
    - 3-4% oleic acid content
    - Good cooking oil (high flash point)
  - "Light" Olive Oil
    - Not low cal!
    - Lighter flavor
    - **Refined**
    - Neutral taste – made for cooking (high smoking point)