Use of substrates for intensive production of vegetables in Europe and Mediterranean regions

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State of art of soilless culture

- Protected cultivation have a worldwide surface of nearly 2 million hectares
- Soilless culture extend on about 31,000 hectares
- Netherlands 6,000 ha
- Spain 5,000 ha
- Italy 1,000 ha
- China 1,000 ha
Hydroponics classification

- System without substrate (NFT or floating)
  - suitable for short cycle
- Aggregate culture
NFT system
floating system
aggregate culture
Type of substrate

- The most diffuse are
  - Peat, Perlite, Rockwool slabs, coconut coir,
- Beyond these we have
  - sand, sawdust, volcanic rock, pumice and expanded clay
- Dregs of processed grapes and rice husk
Substrate Characteristics

- The substrate should provide the mechanical support
- Locally manufacture substrates are preferred
- The environment impact should be taken in account
Substrate characteristics

- Mechanical properties
- Porosity
- Water and air capacity
- pH
- Content of soluble salts
- Chemical inertia
- Ability to maintain original characteristics
- Absence of pathogens
Hydraulics properties

- Volume (%)
- Tension (kPa)

- Air capacity
- Easily available water
- Available water
- Water buffer
- Porosity
- Solid phase
Hydraulics properties of three substrates

- **Peat**
  - 38% Air capacity
  - 12% Easy available water
  - 77% Water buffer

- **Rockwool**
  - 15% Air capacity
  - 60% Easy available water
  - 1% Water buffer

- **Perlite**
  - 12% Air capacity
  - 1% Easy available water
  - 1% Water buffer
Capillary action

- The ability of substrate to transfer the water from the button to the surface
- It depends on the pore size of substrate and tension of irrigation water
Sub-irrigation

**Advantages:**
- It reduces the risks of spreading root pathogens
- It minimises the interference of substrate and plant root system on the composition of the nutrient solution

**Disadvantages:**
- It determines salt accumulation in the upper part of the growing container
Sub-irrigation
Sub-irrigation: effect on the root apparatus.

Drip irrigation

Subirrigation

Top

middle

bottom
The substrata used in the Mediterranean countries

- Perlite
- Peat
- Volcanic rock
- Pumice
- Pouzolane
Concluding remarks

- Which will be the use of substrate in the next future?
- Which will be the role of peat?
- May compost substitute peat?