Hydroponics as a sustainable alternative to conventional agriculture

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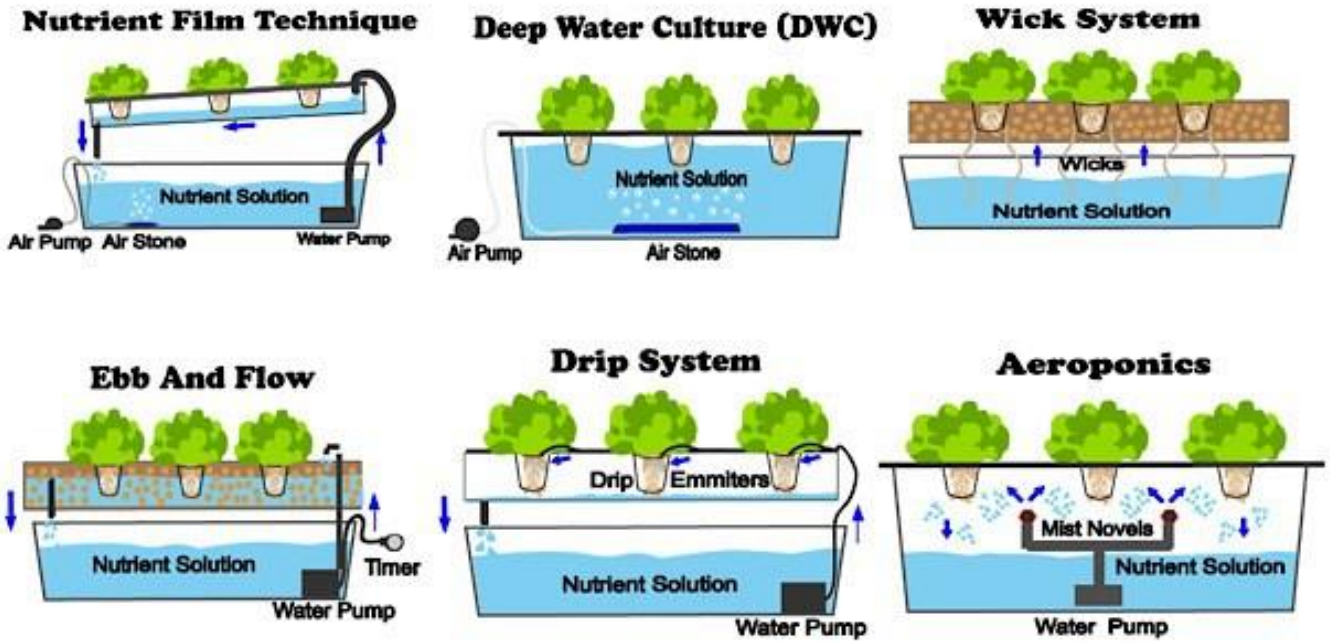
Definition of hydroponics

The practice of growing plants without soil in nutrient solution, with or without use of any solid substrates.



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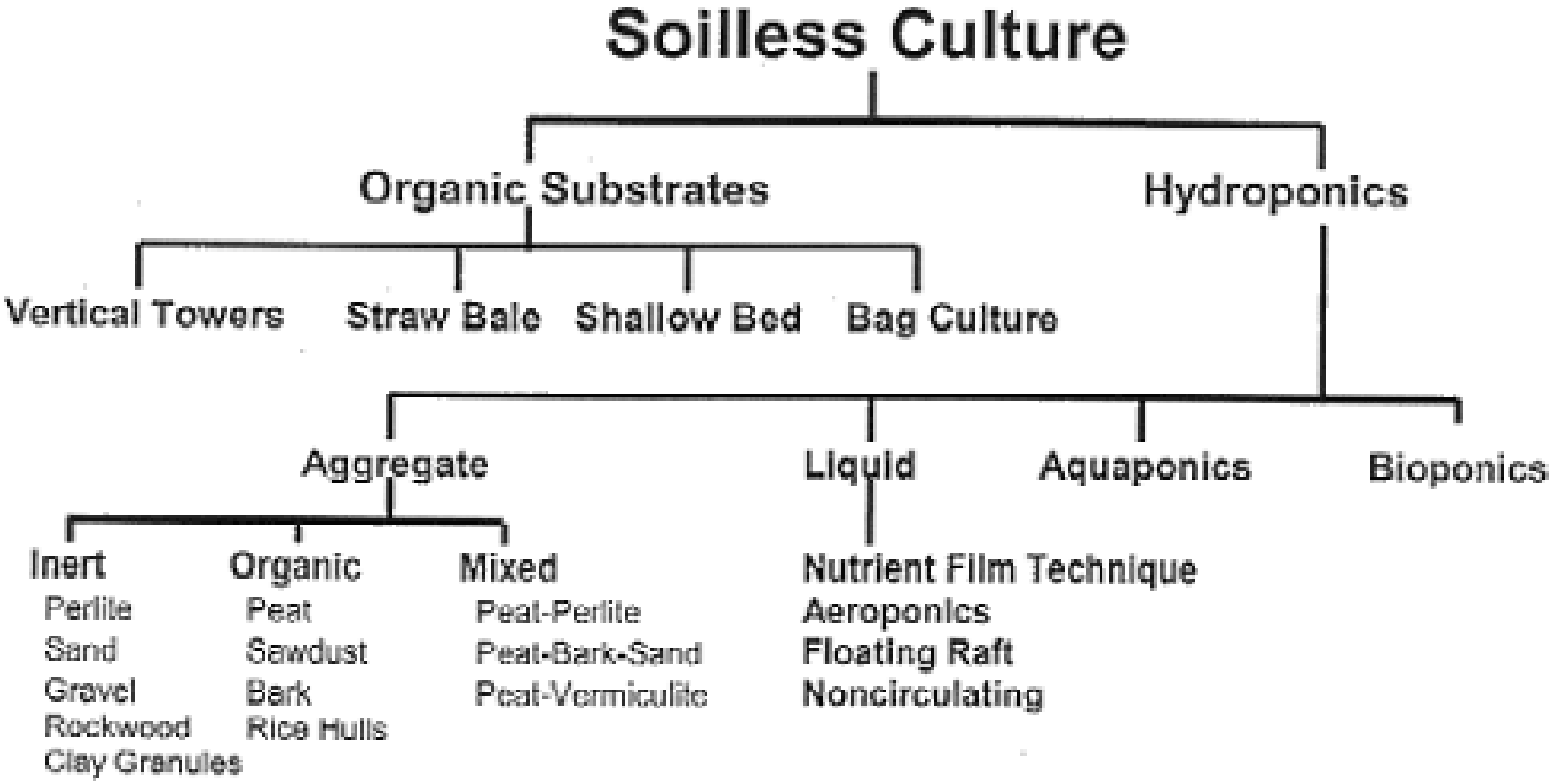

Source: https://attra.ncat.org/attra-pub/viewhtml.php?id=45

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Advantages of hydroponics

- Growing at locations and areas where there is no soil or soil is unsuitable for growing vegetables,
- Continuous cultivation of the same crop in the same production area (no need for crop rotation),
- Better control and supply of plants with water (time and quantity),
- Better control and supply of plants with plant nutrients (during growing season, the concentration, composition, time and amount of nutrient solution could be changed as needed)

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Advantages of hydroponics

- Reduced attack of plant pests (pathogens, pests, nematodes, weeds) that require the greenhouse soil for their development,
- Preservation of underground water from pollution that is possible in the conventional plant production, especially if closed hydroponic systems are used.
- The above advantages result in higher production of biomass in the unit of time and per unit of surface in hydroponics in relation to the convetional soil cultivation, and thus earlier harvest (with faster access to technological maturity), a higher number of harvests in varieties that are repeatedly harvested and higher overall yields.

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Dissadvantages of hydroponics

- High initial investment, ie, higher costs of installing hydroponic systems compared to conventional soil cultivation,

- Requires a high level of knowledge and expertise in the field of agronomy and technical skills and knowledge to manage the equipment being applied,

- When the disease and pests occur, the infection spreads rapidly due to optimal conditions for their development in the greenhouse,

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Dissadvantages of hydroponics

- Successful application of hydroponics technology is limited to varieties of high economic value, in some regions often for a certain part of the year,

- Problem of disposal and recycling of inorganic substrates after use

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Comparison of economic indicators of different tomato production methods

	Conventional production	Integrated crop production	Soilless production	Organic production
Yield (kg/ha)	20.000	20.000	400.000	15.000
Market price (euro/kg)	1,00	1,20	1,50	2,00
Total income (euro/ha)	20.000	24.000	600.000	30.000
GM1 (euro/ha)	13.803	18.651,64	418.475,00	21.385,25
CP1 (euro/kg)	0,31	0,27	0,45	0,37
GM2 (euro/ha)	12.284	17.320,49	399.949,15	21.711,48
CP2 (euro/kg)	0,39	0,33	0,50	0,44

Source: http://www.fao.org/3/a-i6787e.pdf

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Examples of hydroponic production in Croatia

- Curretnly there is about 80 ha of hydroponic production in Croatia
- Grown varieties: tomato, pepper cucumber
- There is no comercial hydroponic production of leafy vegetables and herbs
- Some of the largest producers are:
  - Osatina grupa http://www.osatina.hr/en/
  - Zarja http://zarja.hr/

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Sustainability of hydroponic production at Zarja

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Conclusions – open questions

- Higher yield and quality are achived in hydroponics
- Hydroponics are more environmental friendly
- Higher costs of hydroponic systems
- Energy and water consumption of hydroponics

- **Could hydroponics be realy sonsidered as optimal solution for zero hunger?**

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