
Soilless
HORTIS

· SOILLESS SYSTEMS ·

WHAT IS IT?

IN SOILLESS AGRICULTURE, PLANTS ARE GROWN IN CONTAINERS. PLANT ROOTS MAY BE HOSTED ON A SUBSTRATE OR DIRECTLY FLOATING INTO A WATER SOLUTION ENRICHED WITH NUTRIENTS. ALTHOUGH SOILLESS CULTIVATION IS GENERALLY ASSOCIATED WITH HIGHLY TECHNOLOGICAL SYSTEMS (REQUIRING INVESTMENTS AND EXPERTISE), SIMPLIFIED SOILLESS SYSTEMS ARE FOUND IN MANY URBAN GARDENING EXPERIENCES, ADAPTING TO THE CITY LANDSCAPE AND ENABLING GARDENING WHERE NO FERTILE SOIL IS AVAILABLE.

WHY A SOILLESS GARDEN?

The main reasons to use simplified soilless systems are the following:

- Low-cost and easy-to-learn technique.
- Reduced labor required.
- Soil-free production of a broad range of vegetables, flowers and aromatic species in courtyards, small gardens, on walls, balconies, and rooftops.
- Reduction of the incidence of soil-borne diseases.
- Use of recycled/low cost materials to build growing containers.
- Potential intensification of production per surface area.
- Improved products quality through better plant nutrition and reduced use of pesticides.
- High efficiency in the use of water and nutrients, by adoption of closed cycles.
- Short chain between harvest and consumption with reduced depletion of the product.

HOW DO YOU MAKE IT?

A soilless system is composed of three main elements:

- **Growing unit:** hosts the substrate and the plant roots and may integrate the water delivery and drainage system. Complexity may dramatically vary, ranging from pots or containers made out of recycled wood pallets to most complex structures where plastic (e.g. recycled water bottles) enables to recover the drained water solution and re-use it for greater water and nutrient use efficiency. As a general rule, there is not a best cultivation system, but indeed, there can be an optimal solution according to every situation.
- **Substrate:** offers plant support as well as balancing water retention and drainage. It may be an organic or inorganic media, though most commonly adopted are peat, potting soil, perlite, coconut fiber, pumice and expanded clay.
- **Nutrient solution:** enables to jointly deliver water and nutrients to the plant. Minerals are generally integrated into the substrate (e.g. organic manure or granular fertilizers) or dissolved in a water solution (improved productivity for the greater nutrient availability). Beware that exceeding salts dissolved may result in plant death!

WHICH SOILLESS SYSTEM SHOULD WE USE?

Simplified soilless systems may be divided into two main categories, according to the destiny of the water drained after irrigation: closed loop systems are those that recycle drained water and re-use it for further irrigation (greater water use efficiency), open loop systems are those where exceeding water is drained and discarded (cheaper and requiring lower technology and skills).
Another classification may be operated considering how the water is provided to the system. Some systems (e.g. floating systems, deep water culture) maintain the water reserve always in contact with the plant root system (lower technology and labor requirement), whereas other systems have water provided periodically and then left to drain (improved water oxygenation and yield).

THINGS TO BEAR IN MIND

- Adapt the system to the available material, your willingness to invest money and energy on it and the place where it will be located;
- Beware of salinity stress, avoid exceeding 3 g of fertilizer per liter of water and mix the exhausted nutrient solution with freshly prepared nutrients;
- Roots floating in water are better suited to short cycle leafy vegetables, whereas substrate systems are generally preferred when growing fruit vegetables;
- Always size your system according to your time and working capacity. Better to start slowly than have to face excessive workload and failure!
- Soilless gardens generally require little daily work. This means lower effort, but same commitment: never forget that the garden is a living ecosystem!
- In closed systems up to 80% of the water normally used in traditional farming is saved;
- “Soilless” is a synonym of “Hydroponics”.
- Temperatures experienced during warmest periods may be excessive to enable plant growth. The adoption of shading structures is highly recommended.

TOOLS

- A drip irrigation system, connected to a hydraulic timer may allow to reduce both water consumption and labor needed for irrigation;
- For building up your system from recycled wood (e.g. pallet), first design it (surf on internet for inspiration!), make sure to have all needed equipment (saw, drill, screws, nails, hammer, sandpaper, wood impregnating agent), and then free your imagination!

INTERACTIVE QUESTIONS

- May a plant in a pot be considered a soilless system?
- Does a soilless system require more or less water than plants grown on the ground?
- Do soilless gardens require extensive use of chemical fertilizers and pesticides?
- Is it true that the most I supply the garden with fertilizer, the greater will be the yield?
- Which are the main reasons to choose soilless?

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