



## Landless Farming: Hydroponics

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Ever since humans have mainly transitioned from a nomadic to an agrarian lifestyle, people have tried a variety of novel approaches to food cultivation. Finding that plants may thrive without soil was one of the greatest discoveries in agriculture. Actually, hydroponic systems can be used to enable growing. Plants grown hydroponically receive all the nutrients they require without having soil around their roots. Growing hydroponic plants frequently occur without the need of a soil-like growing medium.

### What is Hydroponics?

To put it simply, hydroponics is the practice of growing crops directly in nutrient-rich water without the use of soil by substituting a different material for the plant's roots. Although there are several ways to create hydroponic systems, the fundamental components are always the same.

Hydroponically grown plants can be grown outside, greenhouses and other indoor facilities are the primary locations for most hydroponic systems. Home hydroponic plant growth is made possible by a variety of compact, commercially accessible hydroponic systems.

### What Is the Mechanism of Hydroponics?

The water (hydro) does the job or labour (ponos) in hydroponic gardening, as the root of the word "hydroponics" implies.

Plants require a few fundamental things to grow: light, carbon dioxide (which they often obtain from the ambient air flow in their environment), water, and nutrients. Plants in traditional gardening obtain their nutrition from the soil.

Instead of absorbing nutrients from soil, plants in hydroponics absorb them from a liquid nutrient solution mixed in with the water.

Growing in soil can have a significant impact on a plant's root architecture and ability to produce food since nutrients may not be evenly distributed throughout the soil.

Growing in liquid solution, on the other hand, ensures that the plants' roots have constant access to nutrients, resulting in more efficient nutrient uptake and growth. As a result, the plants develop faster and larger than if they were planted in soil.

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## What you require

Pure water. We are discussing premium, pH-balanced, filtered materials. Most plants like water that has a pH of 6.5 to 6.5. You can use over-the-counter treatments that you can get from your neighbourhood hardware, garden, or hydroponic store to change the pH of your water.

**Air (oxygen)-** Keep your plants from drowning! In conventional farming, soil air pockets provide roots with the oxygen they need to breathe. Your hydroponic arrangement will determine whether you need to oxygenate your container (like bubbles in a fish tank) or leave space between the base of your plant and the water reservoir. You can do this by adding an air pump or purchasing an air stone.

**Root support-**Your plant's roots need a little bit to cling to even though you don't need dirt. Vermiculite, perlite, peat moss, coconut fibre, and rockwool are typical materials. Avoid using materials that don't hold moisture (like gravel) or that can compact (like sand).

**Nutrients-** Just as plants growing in the ground require healthy soil and fertiliser, your plant will require an abundance of magnesium, phosphorus, calcium, and other nutrients to remain healthy and productive. This "plant food," which is necessary for soilless gardening, needs to be mixed into the water your plants are receiving. Although it is technically possible to create your own nutrition solution, purchasing mixes online and in stores is convenient.

**Light-** Should you choose to grow your plants indoors you may need to make an investment in specialised lighting. Every type of plant will have various needs for the quantity and positioning of light (usually called Daily Light Integral, or DLI).

The five components mentioned above are the most fundamental components of any hydroponic system, while there are more factors to take into account as your hydroponic farm becomes more sophisticated (such as CO<sub>2</sub> supplementation).

You can start figuring out exactly what your plants require to flourish by keeping an eye on and modifying these crucial factors. Then, you can repeat those settings for each subsequent grow.

## What Advantages Does Hydroponics Offer?

**Doesn't Need Soil:** The first and most obvious advantage of hydroponic gardening is that it doesn't require soil. Why is this relevant? One of the biggest issues facing agriculture and the globe today is land degradation. Farming in degraded soil is getting harder and harder.

Degradation of land can occur through chemical and physical processes. Physical degradation is associated with physical disturbance by farming equipment and natural erosion. Pollution and other forms of contamination cause chemical deterioration. Degradation of either type leaves the soil devoid of nutrients and unfit for producing nutritious crops.

Because hydroponic vegetables don't exacerbate soil erosion, they can mitigate the effects of land degradation. Since the nutrients for these crops come from good topsoil, they are also unaffected by the crisis' outcomes.

**Greater Plant Density:** Plants are easily relocated as they develop since they are not rooted in the ground. Before transferring adult plants into the main growth area, hydroponic greenhouses can complete these preparatory procedures in a chamber specifically designated for germination and seedling production. Plant Density

More plants can be grown in the same amount of space when growing them in liquid media since it takes less space for them to grow than when they are grown in soil.

In addition, compared to growing with soil, you can put a lot more plants in the same amount of land area because you can grow plants vertically, like Bowery. For instance, because we can grow plants on layers that go upward, we can grow a lot more plants in a 25,000 square foot warehouse than on a plot of land with the same square footage.

**Helps to create a microclimate:** With the assistance of technology, gardeners may tailor the ideal growing environment for each crop in a hydroponic greenhouse. Growers can create the optimal microclimates for each type of crop they grow by adjusting the climate appropriately in an enclosed system.

A hydroponic greenhouse may have a section where spinach is kept at a cool 55°F. Closer to 70°F, romaine lettuce might be grown in another location. Growers can produce more types in a single system when they manage the microclimates surrounding each crop.

**Crops Develop Quicker:** The capacity of hydroponic technology to harvest crops more quickly than conventional techniques is one encouraging advancement. Larger and faster crops may be produced when every plant is grown in ideal conditions.

Many growers who use hydroponics claim that their crops mature in half the time—or even less—than those that are produced in soil. Green leafy vegetables exhibit this speed the most, however gains can be made with almost any type of hydroponic plant.

**Makes Food of Higher Quality:** Many people think that food grown hydroponically will taste blander and be deficient in vital nutrients. While certain hydroponic home growing systems might benefit from this, commercial hydroponic farms usually provide higher-quality crops than their soil-based equivalents.

The water supply for hydroponic crops is enriched with scientifically balanced nutrients and meticulously regulated surroundings. They are not exposed to other toxins, insecticides, or pollution. Lastly, because they are usually farmed nearby where they will be eaten, they are usually far fresher when they arrive at your table. All of this results in crops that are at least as healthy as those of the same type that are grown conventionally, in addition to tasting amazing.

In conclusion, hydroponics represents a promising and innovative approach to agricultural practices that has the potential to revolutionize food production. Through the cultivation of plants in nutrient-rich water solutions without the use of soil, hydroponics addresses various challenges associated with traditional farming methods, such as limited arable land, water scarcity, and soil degradation.

The efficiency of nutrient uptake in hydroponic systems allows for faster plant growth and higher yields compared to conventional farming. This not only contributes to increased food production but also minimizes the environmental impact by reducing the need for land and water resources. Additionally, hydroponics enables precise control over nutrient levels, pH, and environmental conditions, optimizing plant health and minimizing the use of fertilizers and pesticides.

The adaptability of hydroponic systems makes them suitable for diverse settings, including urban environments and areas with unfavourable soil conditions. As the global population continues to grow and environmental challenges intensify, hydroponics offers a sustainable and resource-efficient solution to meet the increasing demand for fresh and nutritious food.

While there are initial setup costs and a learning curve associated with hydroponic farming, the long-term benefits in terms of productivity, resource conservation, and environmental sustainability make it a compelling option for the future of agriculture. As technology advances and more research is conducted, hydroponics is likely to play a crucial role in shaping the future of food production, contributing to a more resilient and sustainable global food system.