

Aeroponics – An Advanced Farming Technique

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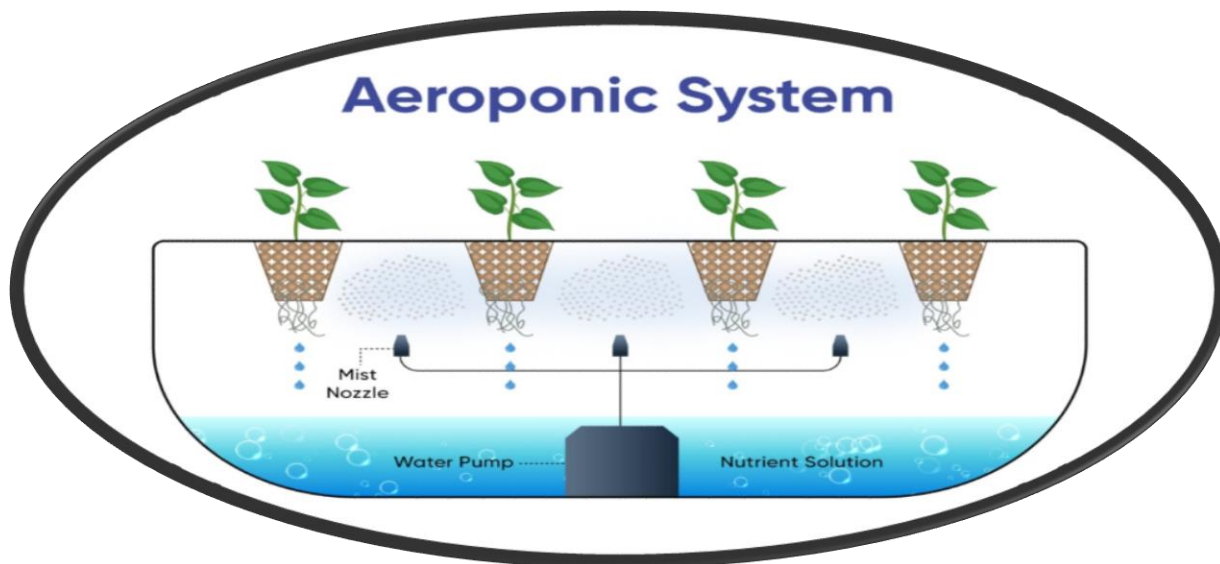
Aeroponic comes from the Latin words "aero" (air) and "ponic" (labour) (work). This is an alternate technique for soil-free cultivation in conditions that regulate development. Aeroponics is the practice of growing plants in an atmosphere of mist or air without the need for soil or by spraying the roots with hydroponic solutions that are floating in the atmosphere. It doesn't make use of soil or aggregate media. A nutrient-dense fluid is sprayed on the plant roots at predetermined intervals while the plant roots are suspended in a dark container in an aeroponic system. With this technique, nutrients are delivered extremely precisely, and since roots receive enough oxygen, growth may occur more quickly. This system may have clogging problems since relatively small holes are used for spraying.

Aeroponic Farming

Aeroponics is a method of growing plants that do not require soil. Roots are suspended in the air and irrigated with a nutrient-dense mist instead. This is in contrast to hydroponic systems, in which plant roots are submerged in a nutrient-rich solution on a regular basis. The plant you want to grow is suspended in an atmosphere that is typically fully or partially closed in an aeroponics system. In order to manage the amount of light, air and nutrient-rich water spray delivered to the plant, it is best to carry out this procedure in a closed, controlled environment. Since they receive more oxygen to carry out their food-producing activity and are less vulnerable to pests and diseases, plants typically flourish in misty and airy environments. By spraying the plant's lower stem and dangling roots with a nutrient-rich water solution that helps them absorb the nutrients they need to generate nutrient-rich food to be consumed later, the necessary nutrients are delivered.

The plant's lower stem area is covered with biodegradable foams, which is then connected to or inserted into the aeroponics chamber apertures.

The nutrient-rich liquid is dispersed in aeroponics chambers, where the time of the spraying is automated. For this system to work well, it is crucial to maintain a proper temperature and make sure that the necessary amount of nutrient-rich mist is available.



Difference Between Aeroponics and Hydroponics	
Hydroponics	Aeroponics
Hydroponics is a method of growing plants in nutrient-enriched water and without soil.	Aeroponics is a method of growing plants without soil, where the roots are exposed to the air.
The roots of the plants are exposed to nutrient-rich water.	The roots of the plants are exposed to nutrient-rich mist.
Requires a comparatively larger supply of water than aeroponics.	Water requirement is very less.
Chemically inert media is used to hold the plant (clay, sand or gravel).	No such medium is used.
Supports more variety of plants.	Most feasible for plants such as olives and citrus plants.
Relatively low maintenance system.	Requires comparatively more maintenance.
Relatively cheap.	Comparatively expensive.
Less subjected to outages.	More subjected to outages.



Types of aeroponics

There are two main types of aeroponics: low pressure and high pressure. Low pressure is the most used by home growers since it is low cost and easier to set up, whereas high pressure is the preferred method for commercial production as it is typically more efficient.

High-pressure aeroponics

High-pressure aeroponics uses high-pressure pumps to convert the nutrient solution into a fine mist. The mist is then delivered directly to the roots of the plants through a highly pressurized nozzle.

High-pressure aeroponic systems require a pressurized reservoir capable of holding 60 to 90 psi, along with commercial-quality nozzles that can create a fine enough mist. The fine mist created with high-pressure aeroponics provides more oxygen to plant roots, allowing them to absorb the nutrients quickly and efficiently.

Low-pressure aeroponics

Low-pressure aeroponics uses a low-pressure pump to create a gentle mist that is delivered to the roots of the plants. With low-pressure aeroponics the mist is more like a light spray or droplets, and is designed to allow the roots to absorb the nutrients slowly and steadily, providing a more gradual and consistent source of nutrients.

This method of aeroponic growing is often used for delicate and slow-growing plant species that may be damaged by high-pressure mist systems, as well as DIY growers as it is inexpensive to set up.

Examples of aeroponics

- **Vertical aeroponic gardens:** This type of aeroponic system is designed to grow plants vertically, in a stacked arrangement, allowing for maximum use of space in a limited area. For example, the Air Garden is a vertical aeroponic garden that allows you to grow 30 plants in just one metre².
- **NFT (Nutrient Film Technique) aeroponics:** This type of aeroponic system involves circulating a thin film of nutrient-rich solution over the roots of the plants. The film is constantly replenished, providing a continuous supply of nutrients.
- **Closed-loop aeroponics:** This type of aeroponic system is fully enclosed and recirculates the nutrient solution, reducing water waste and providing a stable, controlled growing environment.



- **DIY aeroponic systems:** There are many DIY aeroponic systems available that allow individuals to set up their own aeroponic growing system using off-the-shelf components and basic construction skills.
- **Commercial aeroponic systems:** Commercial aeroponic systems are used by large-scale growers and can be designed to grow a wide variety of crops, including leafy greens, herbs, and small fruits.

What can we grow with Aeroponics?

However, they are best suited and most commonly used for growing plants like herbs, leafy greens, and vining vegetables (e.g. zucchini, capsicum, tomato and cucumber). Unlike with hydroponics, rooting crops like potato and carrots can also be grown in horizontal systems as the roots have plenty of room to grow, however they have more complex nutrient requirements.

Advantages of Aeroponics

- **Productive and Sustainable:** Compared to soil-based farming, this sustainable method of food production uses 80-90% less water. If you aim to go fully commercial in this field, you can grow more food, healthier types and also more profitably because you can use height and air as a growing place.
- **Air Exposure Promotes Healthy and Rapid Plant Growth:** As aeroponics is used to grow plants in the air with tiny drops of water, it is ideally suited to promote rapid plant growth in virtually any species. As a result, compared to soil-based farming, more plants can be grown in less time.
- **It Can Be Cultivated without Land:** If you have a place in your tiny garden or on the roof, you may use it right now to grow your food, which fully eliminates the need for you to have a huge amount of land under cultivation. To experience the beauty of aeroponics and to meet your daily food needs, you can even build small aeroponics units in your living room or balcony.
- **Photosynthesis is Promoted via Aeroponics:** This feature makes it environmentally friendly too. By removing a considerable amount of carbon dioxide from the environment and managing its concentration inside the system, aeroponics has an impact on how rapidly plants produce oxygen in their leaves.

Disadvantages of Aeroponics

- Along with the associated costs, proper expertise and training are necessary to get going. If one is going to start using aeroponics, they need to be thoroughly trained in how to keep the system clean. The caretaker of this system must always upgrade their abilities because it is a scientific system supported by technology that is still developing.
- It entails difficulties in sustaining the tangible elements. Numerous components make up this system, some of which, if improperly maintained, could cause a system failure.
- Maintaining the proper supply of light and supply of air for the exposed part of the plant, in the closed or indoor methodology of aeroponics farming can occasionally be challenging, especially when vertical farming in the air is the way to produce more. This is where artificial lighting becomes important.

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