

Aeroponics – New Era of Farming

Chandan Kumar¹, Anoop Badoni², Adarsh Dangwal², Ashish Negi², Jhanvi Bajpai¹,
Alisha¹ and Archana Prasad¹

¹Department of Agriculture, Uttaranchal P.G. College of Biomedical Sciences and Hospital

²PLANTICA- Indian Academy of Rural Development (IARD), Dehradun, Uttarakhand

SUMMARY

Aeroponic is a concept of modern era, in which farming of crops, vegetables and plants are cultivated without soil or ample amount of water. It is practice by growing plants and vegetables in close environment, where plant is suspended in air and hydroponic solution are provided to roots in form of mist to grow and develop. Aeroponic is a subgroup of hydroponic in which plants are grown only with the help of water and nutrients required by the plants. Aeroponic is extended version of hydroponic in which use of water is reduce to minimum. Aeroponic system comes in different types of setups some are LPA, HPA, Ultrasonic fogger aeroponic system which works on Low and high pressure principle. One of the biggest Advantage is that it requires 95% less water to grow compare to conventional method which makes it modernized farming for people. The cost setup and maintenance is the big hurdle to cross by common man. The method and apparatus, developed by Richard Stoner which was later in 1997 research and study went in the space by NASA organization in OCD method, which was a success. The world with declining fresh water supplies and mega tons of soil erosion, aeroponics is emerging star for new era of farming for humans. In coming future, Aeroponic will have greater meaning in Agriculture and crop production.

INTRODUCTION

Aeroponics is the process of cultivating or growing plants in air or mist environment without using soil or any other hydroponic solutions in which roots are suspended in air. The word "aeroponic" is derived from the Greek meanings of *aer* (ἀήρ, "air") and *ponos* (πόνος, "labour"). Aeroponic culture differs from both conventional hydroponic, aquaponic, and in-vitro (plant tissue culture) growing. Aeroponic is subgroup of Hydroponic wherein aeroponics systems, seeds are "planted" in pieces of foam stuffed into tiny pots, which are exposed to light on one end and nutrient mist on the other. The foam also holds the stem and root mass in place as the plants grow. plant roots are suspended in dark room and nutrient packed solution is sprayed on the roots of the plant at certain intervals. Nutrient deliver at fast and efficient way to the plant through roots and the roots get ample amount of oxygen from surrounding.



Source-Lilkin / shutterstock.com.

Types of Aeroponic Systems

Low-pressure Aeroponics (LPA) This is the most commonly used aeroponic type used by most hydroponic hobbyists due to its ease to set up, availability at any hydroponic shop, and low cost. Low-pressure creates droplet size much different from the high-pressure aeroponic system. What you need for this system is just like any hydroponic system – a pump strong enough to move the water onto the sprinkler heads to spray water around the plant root zone.

High-pressure Aeroponics (HPA) This type of Aeroponics is more advanced and quite costly to set up as it would require specialized equipment. So they are often used in the commercial production rather than home growers. This system creates such a fine droplet size that create more oxygen for the root zone than the LPA, making it the most efficient system among all aeroponic types.

Ultrasonic fogger Aeroponics Ultrasonic fogger Aeroponics, or commonly called fogponics, is another interesting type of Aeroponic system. As the name means, growers would use an ultrasonic fogger to atomize water into super small droplets of water. These are very tiny and you will see it in the form of fog.



Source- Globe Guide Media Inc/shutterstock.com

Benefits and Drawbacks: Germination, root cuttings and growing time are cut in half time. It take less space as compare then traditional farming, and in this farming effectively use 95% less water than soil based method. Increased profit allow for the investment and expansion of the system. Plant grows up to 3x more quickly then conventional method. A typical aeroponics system is made up of high Pressure pumps, sprinklers and timers. If a disease appears, all plants in the system will be effected. We have to monitor it constantly with expert technical staff. It is an expensive growing method to setup initially. Only high pressure is suitable for long term growth project.

History: Aeroponic method and apparatus, developed by Richard Stoner, Founder and President, for greenhouse and nursery crop production. It utilizes an enclosed pulsed application of a hydro-atomized nutrient mist for rapid propagation of plants from cuttings. This Aeroponic technology was originally marketed in 1983 by Genisis Technology, of Boulder, CO. There are over 1,500 installations of the Genisis Aeroponic technology worldwide. Stoner left Genisis in 1986 and acquired the patent rights in 1988. In 1957, a Dutch scientist called Frits Warmolt Went became the first person to grow plants aeroponically. He grew tomatoes and coffee by suspending their roots in a chamber, where they were sprayed with a nutrient mist periodically. One of the major early adopters was NASA, they experimented with aeroponics as a method of growing plants aboard space flights. This gave them huge weight savings over storing large amounts of food onboard the space shuttle.

*Source – aeroponic.com/smallscalegardener/aeroponic.com

Aeroponic in space

In 1997, NASA-sponsored studies aboard the Mir space station studied adzuki bean seeds and seedlings, a high-protein Asian food crop. While the beans were growing in zero gravity, ground control experiments watched to see how another group of seeds and seedlings responded on Earth. While all of the seeds did well, those aboard Mir grew more than those on Earth. Both sets of plants treated with the ODC method grew more robustly and exhibited less fungal infection than the untreated seeds and seedlings. Results from NASA's research aboard Mir has contributed to rapid-growth systems now used on Earth. Plants are started from either cuttings or seeds,

then suspended mid-air in a growing chamber. The developing root systems grow in an enclosed, air-based environment that is regularly misted with a fine, nutrient-rich spray. Aeroponic systems provide clean, efficient, and rapid food production. Crops can be planted and harvested in the system year round without interruption, and without contamination from soil, pesticides, and residue. Since the growing environment is clean and sterile, it greatly reduces the chances of spreading plant disease and infection commonly found in soil and other growing media. The suspended system also has other advantages. Seedlings don't stretch or wilt while their roots are forming. Once the roots are developed, the plants can be easily moved into any type of growing media without the risk of transplant shock, which often sets back normal growth. Aeroponic systems can reduce water usage by 98 percent, fertilizer usage by 60 percent, and pesticide usage by 100 percent, all while maximizing crop yields. Plants grown in the aeroponic systems have also been shown to uptake more minerals and vitamins, making the plants healthier and potentially more nutritious.



Source- [nasa.gov/vision/earth/technologies/aeroponic_plant](https://www.nasa.gov/vision/earth/technologies/aeroponic_plant)

CONCLUSION

As soil quality of the land is started begin to decline, Hydroponic and aeroponic are alternatives for farming and growing crops for growing population. Aeroponics is considered one of the best methods to grow plants in a soil-free environment and the need for this method has been growing due to a clear need for a more convenient way to grow plants. This technique has proven to be commercially successful for propagation of plants, Seed germination, Leaf crops, Seed potato production, micro green plants in many countries. Aeroponic is future of farming as it does not require any soil or large amount of water, and make farming efficient and economical as it is good in water use efficiency, less time, no seasonal dependence, diseases free plant propagation and less space requirement.

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