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The APRACA Center of Excellence – Green Finance to Agriculture (ARDB ACE-GFA), established on August 8, 2024, under the framework of APRACA, aims to drive sustainable growth in the agri-food sector. Its core mandate includes promoting green and climate finance solutions for agriculture, enhancing capacity building through research, training, and exposure visits, and supporting policy dialogue and knowledge sharing. Additionally, ARDB ACE-GFA provides technical assistance on climate-smart financial practices and strengthens collaboration among national and international partners.



AEROPONICS SYSTEMS

This bulletin is prepared about a new system for sustainable agriculture called aeroponics. Aeroponics is a soilless farming system where plant roots are suspended in the air and nourished by a fine mist of nutrients. This modern method helps save water, optimize space, and boost crop growth compared to traditional soil farming.

Aeroponic System

Aeroponics is a method of growing plants without soil. Instead, roots are suspended in the air and irrigated with a nutrient-dense mist.

This differs from hydroponics, where plant roots are submerged in a solution of water and nutrients.

In aeroponics, the roots have greater access to oxygen, which results in healthier plants, significantly faster crop growth rates and increased yields.

Aeroponics orchestrates a symphony of elements—from suspended roots to nutrient mist—that promotes rapid and healthy plant growth with outstanding efficiency. Key benefits include up to 95% water savings compared to soil farming, accelerated growth rates up to three times faster, higher crop yields, and reduced land use through vertical farming systems. Additionally, since soil is eliminated, risks of soil-borne diseases and pests are significantly reduced, making growing conditions cleaner and safer.

This sustainable technique minimizes environmental impact by maximizing resource utilization and enabling year-round food production in controlled environments. Aeroponics holds great promise for urban agriculture and areas with limited arable land or water shortages, paving the way to a greener, more abundant future for food production.



https://www.radongrow.com/blogs/news/11-major-benefits-of-vertical-aeroponic-farming?srltid=AfmBOormz1QOKAwXhwAhSp7L SgEx3DW5JpfKE4e5xzcHM7qrFA-z_RR



<https://van.nongnghiepmoitruong.vn/open-the-way-for-organic-agriculture-with-aeroponic-vegetables-d369162.html>

“Smart Growth, Zero Soil, Maximum Yield.”

Aeroponics is an innovative method of growing plants without soil, where plant roots are suspended in a chamber or enclosure and periodically misted with a nutrient-rich solution. In an aeroponic system, plants are typically grown in containers or trays with their roots exposed to the air.

A pump or pressurized system delivers the nutrient solution in the form of a mist, which envelops the roots, providing them with essential nutrients and moisture. This method promotes rapid and healthy plant growth while minimizing water and nutrient waste.

One of the key advantages of aeroponics is its ability to support plant growth in a highly controlled environment, allowing for precise adjustment of nutrient levels, humidity, and temperature. Commonly used in commercial agriculture, research facilities, and even home gardening setups, offering a sustainable and efficient alternative to traditional farming methods.

Aquaponics System works

Root Suspension: Plants are typically grown in a chamber or enclosure where their roots hang suspended in the air. This allows for easy access to oxygen, promoting healthy root development.

Nutrient Delivery: Instead of being submerged in a nutrient solution like in hydroponics, the roots in an aeroponic system are periodically misted with a nutrient-rich solution. This mist is usually delivered using a pump or a pressurized system.

Nutrient Absorption: The fine mist envelops the roots, providing them with essential nutrients. Because the roots are exposed to the air, they can absorb nutrients more efficiently compared to traditional soil-based systems.

Moisture and Oxygenation: The mist also helps to keep the roots moist and provides adequate oxygenation. This combination of moisture and oxygen is crucial for healthy root growth and nutrient uptake.

Controlled Environment: Aeroponic systems often operate in controlled environments where factors like humidity, temperature, and nutrient levels can be carefully monitored and adjusted. This precision allows growers to optimize plant growth and maximize yields.

Efficiency and Sustainability: Aeroponics is known for its efficiency and sustainability. By delivering nutrients directly to the roots and using minimal water and nutrients, aeroponic systems can produce higher yields with less resource usage compared to traditional farming methods.

Equipment Needed in Aeroponics System

Growing Chambers or Enclosures: These are containers or structures where plants are housed and their roots are suspended. Growing chambers can vary in size and design, ranging from vertical towers to horizontal trays, depending on the style of aeroponics system.

Mist Delivery System: Aeroponics systems utilize pumps, nozzles, or atomizers to generate and distribute a fine mist of nutrient solution to plant roots.

Reservoir: A reservoir holds the nutrient solution used in the aeroponic system. It may include a pump to circulate the solution to the misting system.

Nutrient Solution: The nutrient solution provides plants with all the necessary elements, including macronutrients (nitrogen, phosphorus, potassium) and micronutrients (iron, calcium, magnesium), in a readily available form.

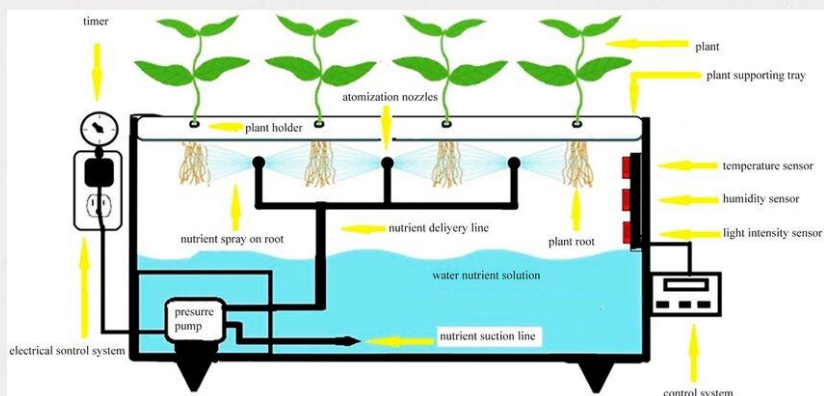
Support Structure for Plants: This support structure can include grow baskets, mesh net pots, or foam inserts that hold the plants in place while allowing their roots to access the nutrient mist.

pH and EC Monitoring Equipment: Meters are essential for monitoring the acidity and nutrient concentration of the nutrient solution.

Timer or Controller: Aeroponic systems often incorporate timers or controllers to automate the misting cycles and regulate environmental conditions such as humidity and temperature.

Lighting System (Optional): While natural sunlight can be sufficient for outdoor aeroponic setups, indoor systems may require supplemental lighting, such as LED grow lights, to provide adequate illumination for plant growth, especially in environments with limited natural light.

Monitoring and Automation Tools (Optional): Advanced aeroponics setups may include sensors, data loggers, and automation systems to monitor environmental parameters (e.g., temperature, humidity, nutrient levels) and adjust system settings automatically for optimal plant growth.



Strawberries: Strawberries can be successfully grown in aeroponic systems, especially varieties bred for container gardening

Tomatoes: Certain varieties of tomatoes, particularly determinate varieties or cherry tomatoes, can thrive in aeroponic systems.

Peppers: Bell peppers, chili peppers, and other pepper varieties can be grown in aeroponic systems.

Cucumbers: Cucumbers are well-suited for aeroponic cultivation, especially compact or bush varieties.

Microgreens: Microgreens, such as radish, broccoli, and mustard greens, are commonly grown in aeroponic systems due to their rapid growth and high nutritional value.

Challenges of Aeroponics

High Initial Cost: Setting up an aeroponic system requires investment in specialized equipment — pumps, misting nozzles, sensors, and automated control systems. For small Cambodian farmers, the startup cost can be quite high compared to traditional farming.

Technical Expertise: Aeroponics relies heavily on technology. Farmers must understand nutrient management, water chemistry (pH, EC), and system maintenance. Lack of local expertise or technical support can make it hard to manage effectively.

Power Dependency: The system depends on electricity to run pumps, timers, and sensors continuously. Any power outage — which still occurs in some rural parts of Cambodia — can quickly damage crops if roots dry out.

Equipment Maintenance: Nozzles can become clogged by mineral buildup or impurities in water, disrupting nutrient delivery. Regular cleaning and maintenance are essential.

Water Quality: Aeroponics requires very clean, filtered water. Poor-quality water can cause system clogs and plant stress — an issue in some regions with limited access to purified water.

Type of plant with Aeroponics

Leafy Greens: Lettuce, spinach, kale, and arugula are popular choices for aeroponic cultivation due to their rapid growth and shallow root systems.

Herbs: Basil, cilantro, parsley, and mint are well-suited for aeroponic systems.



Advantages of Aeroponics

Efficient Water Use

- Aeroponics uses up to 90–95% less water than traditional soil farming.
- The nutrient solution is recycled, making it ideal for dry regions and areas affected by climate change in Cambodia.

Faster Plant Growth

- Roots get more oxygen, promoting faster and healthier growth.
- Many crops (like lettuce and herbs) can be harvested sooner than those grown in soil, improving productivity and profit.

No Soil Required

- Plants grow in air, so no farmland is needed.
- Perfect for urban or space-limited areas like Phnom Penh or Siem Reap, where rooftop or vertical farms can thrive.

Cleaner and Healthier Produce

- No contact with soil means fewer pests, diseases, or chemical residues.
- Ideal for producing organic-quality vegetables that meet urban consumers' demand for clean, safe food.

Reduced Use of Pesticides

- Since plants are grown in a controlled environment, pest problems are minimal—reducing the need for harmful chemicals.

High Space Efficiency

- Aeroponic systems can be built vertically, allowing farmers to grow more crops per square meter.
- Great for Cambodia's urban agriculture and small greenhouse businesses.

Year-Round Production

- Because it operates indoors or in controlled environments, farmers can grow crops all year, regardless of weather conditions.

Environmentally Sustainable

- Reduces water waste, soil degradation, and fertilizer runoff.
- Supports Cambodia's goal of sustainable, eco-friendly farming.



Reference

- <https://www.greeneryretail.com/post/unlocking-the-secrets-of-aeroponics-a-deep-dive-into-its-inner-workings>
- https://www.radongrow.com/blogs/news/11-major-benefits-of-vertical-aeroponic-farming?srsId=AfmBOormz1QOKAwXhwAhSpP7LSgEx3DW5JpfKE4e5xzcHM7qrfA-z_RR
- <https://agrotonomy.com/vertical-farming-with-aeroponic-towers-in-the-philippines/>
- <https://van.nongnghiepmoitruong.vn/open-the-way-for-organic-agriculture-with-aeroponic-vegetables-d369162.html>