



Ultra-Fine Bubble Oxygenation Solutions for Cannabis Cultivation

The Science

Oxygen is essential to plant health - root systems require oxygen for aerobic respiration, a plant process that releases energy for root growth and nutrient uptake. Oxygen supplied for plant root uptake is provided as dissolved oxygen (DO) held in the nutrient solutions used to irrigate the plants. Low levels of dissolved oxygen in the root system reduce plant growth.

As a minimum, oxygen levels should be 8 mg/l for all plants, cannabis included. Pathogens take root in irrigation systems with low oxygen levels. Cannabis nutrient tanks typically have little oxygen (3mg/l or less) due to the high dissolved solids present, yet many growers are unaware of the problem.

Current Solutions

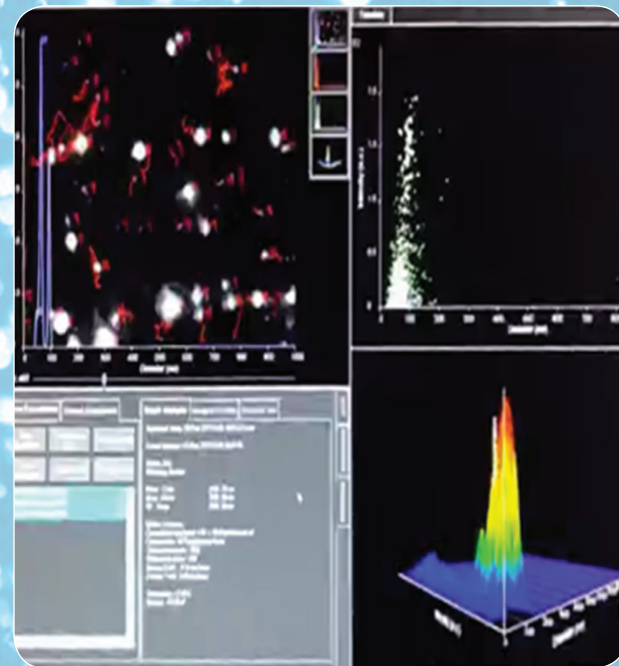
Cannabis cultivators who recognize the problem of low DO employ aeration technologies such as air-stones and diffusers, devices that disperse pumped ambient air into the nutrient solution to increase the dissolved oxygen level to acceptable levels for plant health. Unfortunately, the DO level in the nutrient tanks is far more than what is delivered to the roots of the plants. These technologies (ex; air stones) produce micro bubbles of a diameter of 1 or more microns. Due to their size and properties, while these bubbles are oxygen rich, they quickly rise to the surface of the solution and escape into the atmosphere. What is ultimately delivered to the roots of the plants has significantly less DO.



The Gaia Solution

Gaia technology maximizes the DO delivered to the plant roots by generating Ultra-Fine Oxygen Bubbles of less than 100nm (.1 micron), mixing over 100 million UFBs into every ml of the nutrient solution before transmission to the plants.

Ultra-Fine Bubbles are invisible to the naked eye and can only be measured with sophisticated instruments such as the NanoSight NS 300 which Gaia uses.



Ultra-Fine Bubbles' more negative charge and high internal pressure maximize gas dissolution in water. Further, UFBs stay in solution without gas-off for extended periods of time, over 70 days in an untouched solution, more than long enough to reach the roots of irrigated plants no matter how far they might be from the nutrient reservoir. The roots take up the essential oxygen readily due to the sub-microscopic size of the delivered ultra-fine bubbles. Gaia technology can be readily deployed in virtually any cannabis cultivation setup and medium, from hydroponic to aquaponic to flood and drain and drip. *Most growers report a payback on their Gaia system with one crop.*

Applications for Cannabis

Clones require oxygen to develop roots properly. They consume all the dissolved oxygen in the vicinity of the root zone. Gaia ultra-fine bubbles have a negative charge, attracting positively charged ions that are dissolved in the irrigation solution, enhancing nutrient bioavailability.

More established plants thrive on microbes in the growing medium around the root ball. These microbes consume oxygen, while converting nutrients into plant ready sugars. Increases in dissolved oxygen rapidly multiply the beneficial microbes, producing more plant ready sugars that further enhance plant growth and resistance to damaging pathogens.

Increasing dissolved oxygen levels in nutrient solutions with millions of oxygen ultra-fine bubbles has returned as much as a 35% gain in plant biomass and increased bud yields of up to 25%.

Powdery mildew and spider mite mitigation can be achieved by spraying water enriched with ultra-fine CO2 bubbles on cannabis crops.



All plants skirted and thinned. In both control room and test room. Plants in test room have more dense foliage, stalks are considerably thicker, and Node sites are closer together, meaning more buds per plant. A vast difference compared to control room!

What Our Growers are Saying

"We are seeing exceptional growth from our latest batch in grow room 1 and will be planting a new round of plants into grow room 2 this coming week. We're excited to receive the next system for grow 4 as we know that your tech gives our plants a huge helping hand with the O2 delivery, thank you for reaching out when you did! Most of the time it's pretty subjective when you spend money on tech and never really know if you're getting the results you expect and can honestly say that I don't feel that way at all with your system, money well spent!"

-Warren Bravo, CEO, - Green Relief, Ontario Canada

"I'm now on my fourth grow cycle using my Gaia O2 system and I'm very pleased with the results. I'm seeing each plant increase from 6-8 oz. per plant to over 10 oz. per plant on average and a 15%-20% increase in final dried weight of my entire harvest. When I walk my rooms the visual difference between my Gaia room and my air stone room is significant. The plants in my Gaia room have larger diameter stalks, noticeably more lush vegetation and most importantly, bigger buds. The benefits of my Gaia are obvious. There's nothing else out there like it. Comparing Gaia water to air stones is like comparing a Lamborghini to a bicycle."

- Robert, San Diego, CA

"After introducing the Gaia O2 system into my cultivation facility I realized ~ a 20% increase in my yields. In short, my harvest was taller and thicker than ever before!"

- Shane, Phoenix, AZ

"With over 12 years of growing experience, I am always skeptical of any product that claims to increase yield. However, within one harvest it was obvious the Gaia O2 system was making a big difference in the size and quality of my crops! The Gaia O2 system is now a permanent fixture in my operation."

- Alfred, Glendale, AZ

"I have never seen root balls so healthy and developed! The benefits of the Gaia O2 system are impressive to say the least!"

- Jason, Phoenix, AZ



Gaia USA, Inc.

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