



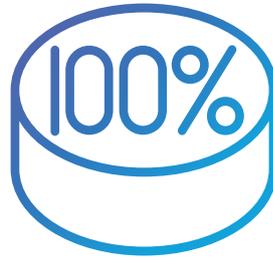
BIOQUELL CASE STUDY

Complete decontamination of hydroponic room in vertical farming facility

Vertical Farming Company, Singapore.



Zero cross over contamination discovered in the batches after bio-decontamination



Success on 100% of indicators used to verify bio-decontamination



Two rooms decontaminated covering nearly 450m³

Executive Overview

When a Singapore-based vertical farming facility, needed a fast and effective alternative to its slow and labor intensive manual cleaning operations during a crop changeover, it turned to Bioquell and its highly effective Rapid Bio Decontamination Service (RBDS). Bioquell RBDS successfully decontaminated its indoor vertical hydroponic room without interruption to the company's workflow.

This vertical farming company provides locally grown 100% clean produce including strawberries, kale and lettuce, farmed with modern hydroponic methods and the latest technology. The company ensures this is done with no exposure to pesticides, insects, external pollution and heavy metals.

As part of this company's best practice, decontamination works are carried out with a changeover of crop. For large scale decontaminations, this process proves to be very manually intensive and time consuming without fully eliminating the risk of a contaminant that could spoil the crops produced.

Bioquell RBDS offered a fast, effective and safe solution with minimal impact to production, eliminating contaminants from every exposed **surface** rapidly.

During the changeover, Bioquell's hydrogen peroxide vapor process provided a 99.9999% pathogen reduction on every exposed surface for a 6-log kill. The process was validated with indicators showing a successful 6-log bioburden reduction in the facility hydroponic room.



"Bioquell's RBDS service was timely, efficient and effortless – it is quality decontamination with assurance that our staff and plants could perform business as usual safely and with minimal impact to ongoing activities."

**Vertical Farming
Facility Manager**



Bioquell RBDS deployed during crop changeover



No cross contamination issues during new batch production

Background

Cleaning indoor vertical farms can be a difficult task. Suitable detergents can provide relief between batches but this client was seeking an addendum to their regular cleaning methods. The ask was for a powerful, automated and validated disinfection service to eliminate biological contaminants at a microscopic level, especially in tough to reach areas that introduce the greatest risk. Bioquell met all of their requirements.

Challenges

The company selected Bioquell due to its ability to overcome a number of client specific challenges and to meet project requirements.

Timescales: To minimize downtime of the room, there was a relatively narrow window between the change-over of plants. Disinfection of the area had to be completed in a short time scale.

Efficacy: A high level efficacy process which could be validated was required by the company to remove any potential bioburden in the hydroponic room being targeted.

Safety: Ensure the safety of hydrogen peroxide vapor for use in grow rooms adjacent to live plants.

Bioquell also needed to ensure decontamination of the Fan Coil Unit (FCU) and adequate sealing around raised floors and false ceilings.

Solution

Bioquell's Rapid Bio-Decontamination Service (RBDS) enabled the company to employ patented, low temperature, residue-free bio-decontamination technology without the capital outlay associated with owning equipment.

Scientifically proven 35% hydrogen peroxide vapor from Bioquell was selected due to its high efficacy and safety standards for the company's personnel and live plants located in adjacent rooms. The hydroponic room was treated as a single discrete decontamination zone which helped further minimize the risk of cross contamination.

Full documentation was provided via a final report outlining all areas decontaminated including locations of chemical indicators.

Deployment

Upon arrival at the site, Bioquell RBDS equipment was transferred to the hydroponic room comprising of empty shelving and a water tank. There were a number of gaps and holes around the ceilings which were sealed using plastic sheeting and tape.

There were two distinct phases for decontamination: firstly for the hydroponic room and then the FCU.

The FCU was switched off before Bioquell started the gassing process. Ensuring every possible surface was exposed for decontamination, the first stage of gassing was implemented followed by the partially injected dwell.

When the 6-log decontamination was completed, the second phase was initiated by turning the FCU on and off for five minutes. This was repeated three times during the gassing process.

Once the second phase was finished, the hydrogen peroxide vapor generators were switched off but the FCU and two aeration units were left running overnight. The aeration units helped to quickly break down the hydrogen peroxide vapor to complete the decontamination cycle.

The room was checked the following morning to ensure that the concentration of residual hydrogen peroxide vapor in the area was less than 1 part per million (ppm). Bioquell engineers then removed the RBDS equipment and all 18 chemical indicators before handing the decontaminated room back to the company.

Using Bioquell's unique RBDS solution, the entire room was decontaminated in less than 24 hours.

The decontaminated area strictly adhered to Bioquell safety protocols with all access doors to the hydroponic room sealed using tape to prevent leaks. Warning signs were placed to prevent entry to the area during the cycle and calibrated low level sensors continually monitored the parameter of each area throughout the cycle.

These sensors also ensure that the hydrogen peroxide vapor concentration within the area had fallen below the safety limits after the cycle was complete.

Results

The Bioquell RBDS performed at the hydroponic room has proved extremely successful. After the completion of the process, all 18 chemical indicators demonstrated an expected 6-log bioburden reduction. The project was completed safely, successfully and within the required three-week time frame.

The customer is also exploring options for the purchase of Bioquell equipment so it can perform decontamination cycles of its own culture and experimentation rooms with trained staff members.

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