Empowering Global Food Sustainability

A review of how HyGenikx Technology can significantly increase the shelf life of perishable foods

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THE PROBLEM...

Around the world, almost a third of all the food produced – approximately **1.3bn tonnes – is lost** one way or another each year - including **45% of all fruit & vegetables**

About **1.4bn hectares** or close to **30%** **of available agricultural land,** is used to grow or farm food that **is subsequently wasted.**

Each year in the UK, **15m tonnes of food is lost or wasted** and **consumers throw away 4.2m tonnes of edible food.**

Data shows that **almost half** of all fruits, vegetables, roots and tubers produced **are wasted** along the supply chain.

Fruits & vegetables produced: **1400 million tons**

Reducing food wastage would ease the burden on resources as the world attempts to meet future demand.

Worldwide, a staggering **10% of all greenhouse gas emissions** are linked to food waste.

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The Solution …

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HyGenikx is an advanced and compact, wall mounted air and surface sanitiser, utilising proven technologies

Kills micro-organisms, bacteria, viruses, moulds, volatile organic compounds (VOC's) and fungi - An Anticryptogamic.

24-hour hygiene and safety protection

Infection control

Diminishes / Removes odour problems

Effective in a variety of environments

& Extends shelf life of 'Perishable Foods'

HYGENIKX+ ™

by MECHLINE

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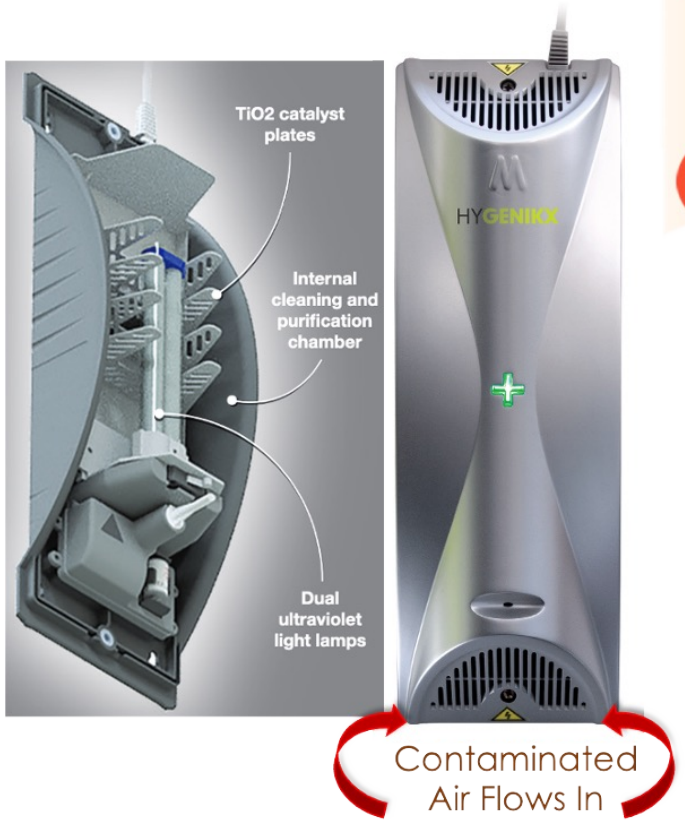
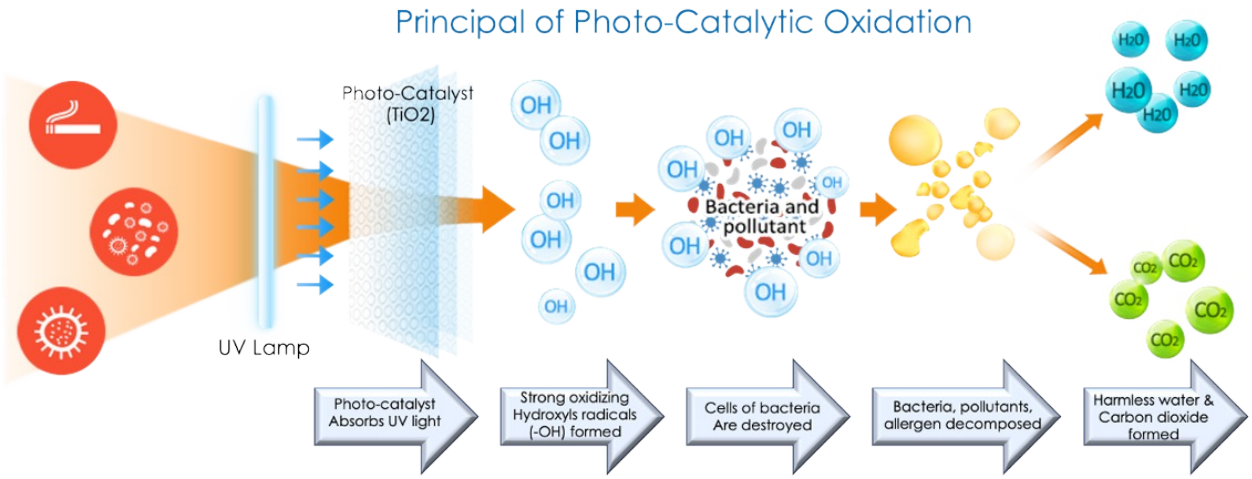
How It Works ... Two Technologies





1. Contaminated air enters through the base of the unit
2. UV light reacts with the Titanium Dioxide catalyst plates creating strong oxidizing radicals (OH)
3. These oxidizing radicals attack & kill the incoming micro-organisms (viruses, bacteria, fungi, molds, etc.) by disrupting their DNA & reproductive capabilities
4. The various micro-organisms decompose forming harmless water and carbon dioxide that are expelled through the top of the unit

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Validation of a Hygenikx air purification unit as an aid to prolong the shelf-life of refrigerated fresh foodstuff and to improve environmental conditions

MATTEO CAPOCEFALO, SPECIALIST MICROBIOLOGY TEAM

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ALS is the UK's leading provider of food and drink testing services. With 7 accredited laboratories located across the UK,

ALS offers a comprehensive range of high quality analytical testing services including microbiological, nutritional, vitamins and minerals, pesticides and contaminants, allergens and speciation

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- A validation project was carried out to establish the ability of a Hygenikx air and surface purification unit (**ASPU**) to prolong the shelf life of **'Perishable'** produce [**Fruit & Vegetables**] stored in a cold room, and, to improve environmental conditions.
- The trial was structured in **two phases** each identical in all aspects with the exception of the introduction of the ASPU in the cold room at the beginning of the second phase. During the 31 days of each of the two phases, the 11 matrices chosen for the trial were examined to establish whether they were still within their shelf-life (this assessment being based on objective guidelines), the surface hygiene and air quality of the cold store were also monitored.

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Summary of ALS Results :

A. Air Quality. **B. Surface contamination.**

C. Mould reduction. **D. Shelf Life assessment**

A. Air Quality :

- The Air Quality readings obtained during **Phase 1** of the trial (without ASPU) averaged at 18.8 cfu/plate. The readings ranged from 60 to 6 cfu/plate and excluding Day 0 as the theoretical highest point due to the introduction of contamination with the fresh produce, the average cfu/plate becomes 17.8 cfu/plate and range remains unchanged.
- The Air Quality readings obtained during **Phase 2** of the trial (with ASPU) averaged at 11.1 cfu/plate. The readings ranged from 100 to 0 cfu/plate and excluding Day 0 as the theoretical highest point due to the introduction of contamination with the fresh produce, the average cfu/plate becomes 4.3 cfu/plate and range 16 to 0 cfu/plate.

Therefore : 76% reduction in ASS cfu/plate.

B. Surface [internal walls, shelf] quality :

- The total ACC Surface Hygiene readings obtained during Phase 1 of the trial (without ASPU) averaged at 9.83 cfu/10cm2 (98.92 cfu/10 cm2 with the floor data) and the readings ranged from 51 to 0 cfu/10cm2 (305 to 13 cfu/10cm2 with the floor data).

- The total ACC Surface Hygiene readings obtained during Phase 2 of the trial (with ASPU) averaged at 5.38 cfu/10cm2 (57.46 cfu/10 cm2 with the floor data) and the readings ranged from 29 to 0 cfu/10cm2 (329 to 4 cfu/10cm2 with the floor data).

Therefore :

- Even in a 'clean' new Coldroom, here was a significant decrease in the recorded levels of surface and air contamination, **with surface contamination displaying a 45% decrease with the use of the ASPU [HyGenikx].**

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C. Mould Reductions

- In normal, unchecked circumstances it would be expected that any contamination (moulds in particular) would yield steady readings from the point of introduction in the environment (i.e. with the fresh produce on Day 0) peaking around days 5-10 which coincides with the maturation and release of spores in the environment of mould colonies following typical fungal growth patterns.
- The pattern described above can be observed in the data derived from Phase 1 of the trial, which shows an oscillation as the environmental spores are introduced and settle in the environment between days 0 and 4 and the mature and peak on day 6 with values more than double those recorded on Day 0, indicative of significant growth.
- On the other hand the data derived from Phase 2 shows a 91% reduction between Days 0 and 1 and a 97% reduction between Days 0 and Day 6, indicative of an external action influencing the growth pattern of the organisms, likely to be the effects of the ASPU.

Therefore : 97% reduction between days 0-6

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D. Shelf Life Assessment :

- The assessment of the shelf life of the products showed an increase in the shelf life of all 11 products. The shelf life gains recorded during Phase 2 of the trial are outlined below, together with the % gain to contextualise the figure (e.g. in the case of short shelf life items such as raspberries, the two day increase is seemingly small overall however it represents a one third increase in the shelf-life of the product).
- Within this dataset, **the highest three increases recorded were Strawberries, with +150% (+9 days), Chestnut Mushrooms, with +107.1% (+15 days) and Grapes with a twofold increase (+12 days).**

- The results of the trial have shown a consistent increase of the shelf-life achieved by the 11 products chosen when the ASPU was employed, **this increase ranged from 14% to 150% with an average increase in shelf-life of 58.1% (or ~7.5 days).**

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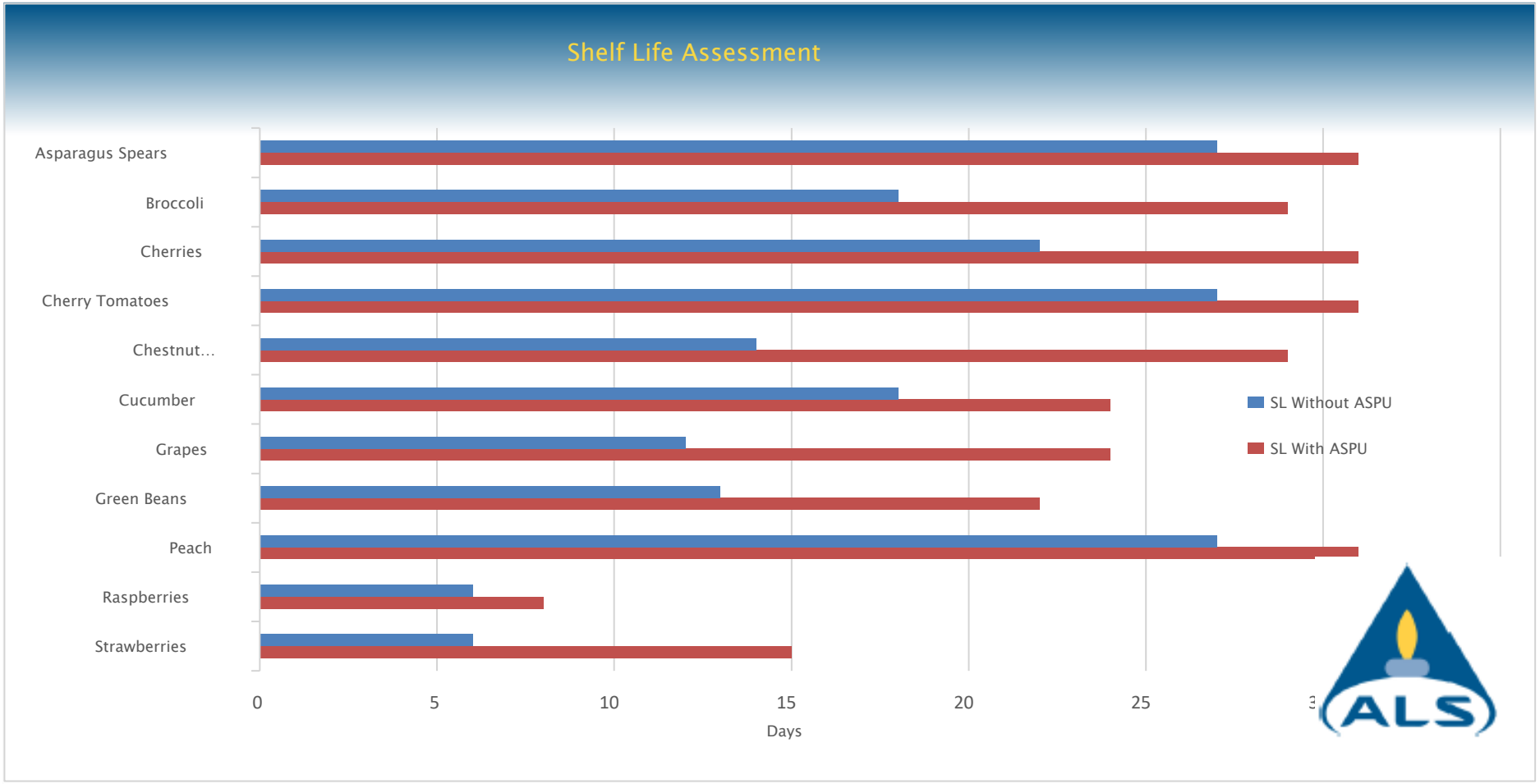
Shelf Life Assessment :



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Standard Coldroom storage – No Hygenikx.

Day 1

Day 5

Day 8

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With Hygenikx Unit Fitted.

Day 1

Day 7

Day 10

Day 15

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- The above increase in the shelf life of the produce was matched by a decrease in the recorded levels of surface and air contamination - In an already '**clean' / new coldroom…**
- Proven to reduce spoilage of perishable food, extending life on average by **58%, and up 150% for certain produce***
- **Surface contamination displaying a 45% decrease** with the use of the ASPU (HyGenikx) and air quality showing a marked decrease of microbial levels
- **Air Quality: 76% reduction in ASS cfu/plate**
- **Mould Reductions: 97% reduction between days 0-6**

'Based on the results above the ASPU was found effective in achieving a longer shelf-life for the chosen produce and improved environmental conditions of the cold room during the trial discusse this report.'

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“ The HyGenikx system helps people to do things in a better way. If I had my way I’d install it everywhere. ”

Cyrus Todiwala OBE, DL.
Indian chef proprietor of Café Spice Namasté and a celebrity television chef.

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SGS

SGS – Total Bacteria Count

Test Report - HKIEQ15-00054 R1		
Sample	Total Bacteria (CFU/m²)	Reduction (%)
Initial	>4400	-
4th hour	23	99.46
12th hour	10	99.77

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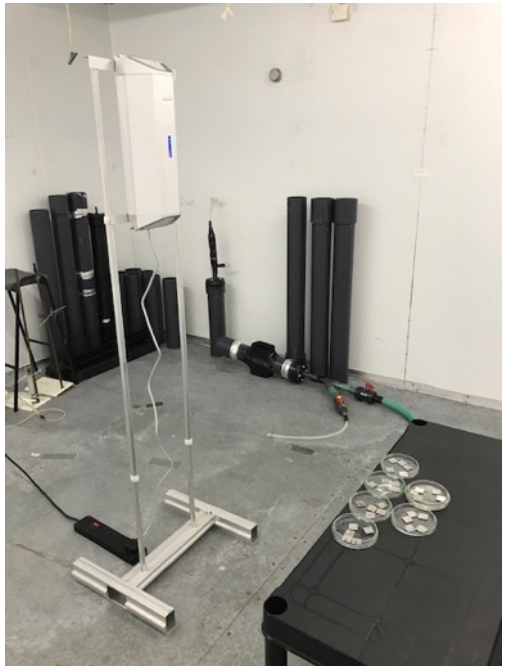
University of Leeds – Testing

- Air disinfection evaluation efficiency

Pathogen	1 hour
E. Coli	100.00%
S. aureus	100.00%
A. fumigatus	100.00%



- Surface disinfection evaluation efficiency

Pathogen	8 hours	24 hours	48 hours
E. Coli	79.60%	97.70%	99.90%
S. aureus	87.40%	91.10%	99.50%
C. difficile	91.40%	98.10%	99.60%