

World problem - Food Waste.

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.



WATER



GAS



WASTE
MANAGEMENT



PEST
CONTROL

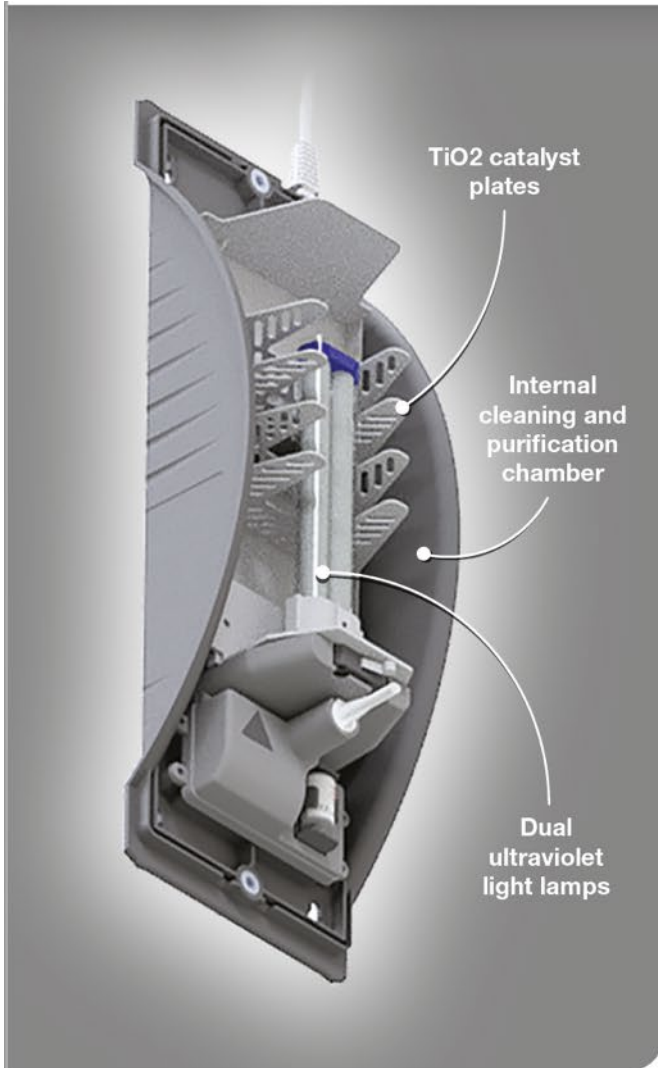
HyGenikx

- 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+TM
by MECHLINE

How it works



The various output dual ultraviolet light lamps operate at the peak UVC wavelengths in the presence of TiO₂ catalyst plates enclosed within our reflective internal cleaning and purification chamber creating germicidal irradiation, PCO – photocatalytic oxidation, hydroxyl radicals, superoxide ions, optional ozone with air leaving the unit as plasma quattro.

This process freshens the air by killing airborne pathogens, viruses, bacteria, fungi, mould spores, allergens and by decomposing odours and harmful gases.

INTERNAL OPERATION AND CATALYTIC REACTION

- Germicidal Irradiation by dual UV light (Ultraviolet) kills microorganisms (bacteria, viruses and mould) by disrupting their DNA and removing their reproductive capabilities.
- PCO – Photocatalytic Oxidation, UV reacts with our Catalyst (TiO₂ Titanium Dioxide) to form highly reactive but short lived oxidising Hydroxyl Radicals (OH) which break down Volatile Organic Compounds (VOCs).
- Interaction of the Dual waveband UV with the TiO₂ heterogeneous catalyst both creates and breaks down Oxygen molecules transforming Oxygen into a highly reactive states of Ozone and Superoxide Ions which leave the unit as "Plasma Quatro".

HYGENIKX+™



Food Life extension – Food Waste reduction - Independently tested

- 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.



Food Life extension – Food Waste reduction - Independently tested

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.

Food Life extension – Food Waste reduction - Independently tested

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].**

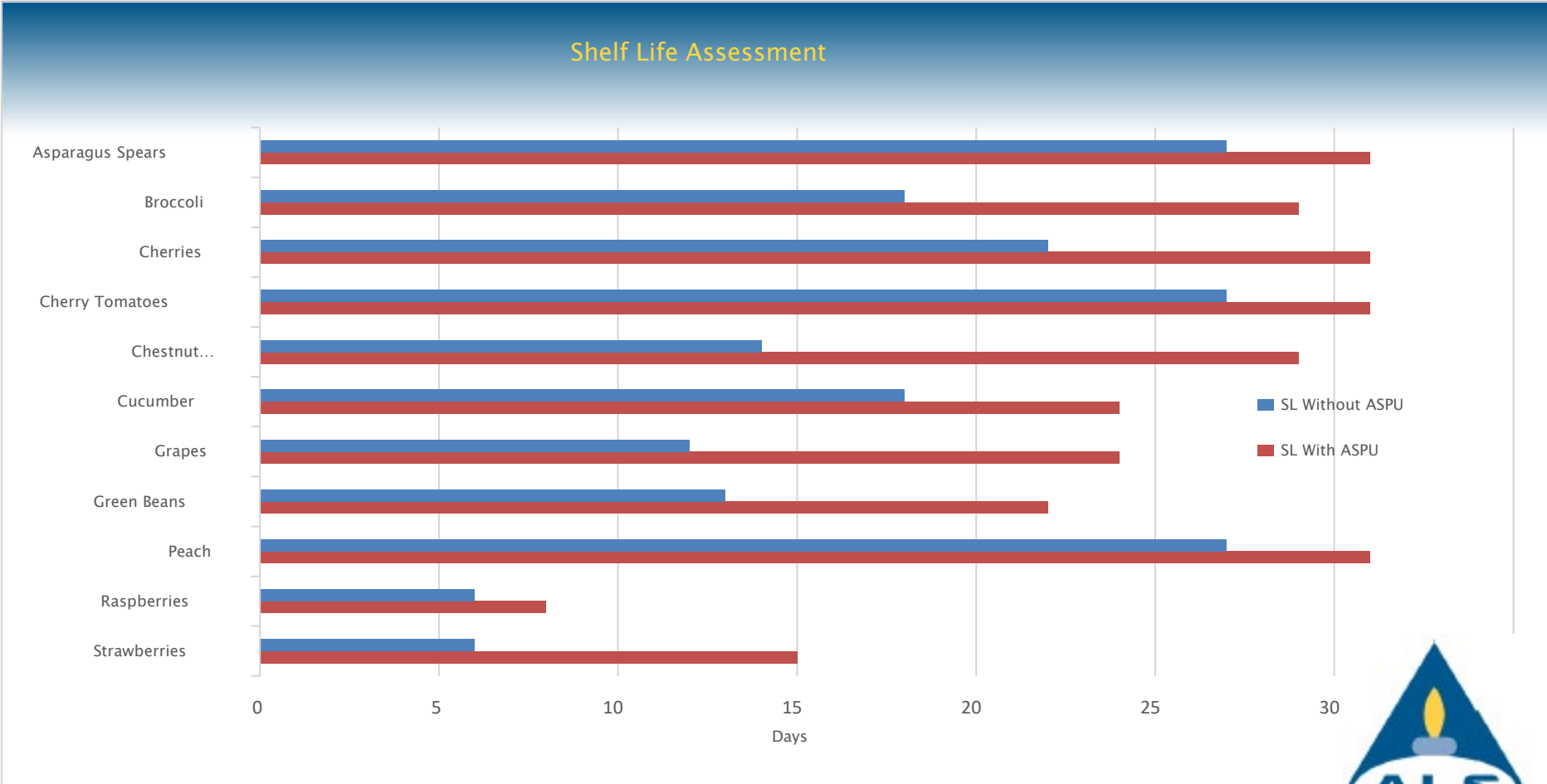
Food Life extension – Food Waste reduction - Independently tested

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).**

Food Life extension – Food Waste reduction - Independently tested

Shelf Life Assessment :



Food Life extension – Food Waste reduction - Independently tested

Standard Coldroom storage – No Hygenikx.



Day 1



Day 5

Day 8



Food Life extension – Food Waste reduction - Independently tested

With Hygenikx Unit Fitted.



Day 1



Day 7



Day 10



Day 15



ALS Conclusions.

- ⌘ 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 longer shelf-life for the chosen produce and improved environmental conditions of the cold room during the trial discussed in this report.'



Further Testing Results

SGS – Total Bacteria Count



Test Report - HKIEQ15-00054 R1

Sample	Total Bacteria (CFU/m ²)	Reduction (%)
Initial	>4400	-
4th hour	23	99.46
12th hour	10	99.77

Testing Results

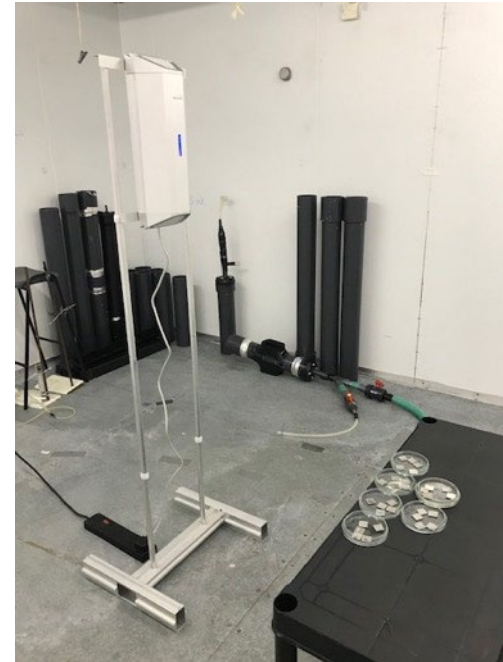
University of Leeds – Testing

- Air disinfection evaluation efficiency

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

- Surface disinfection evaluation efficiency

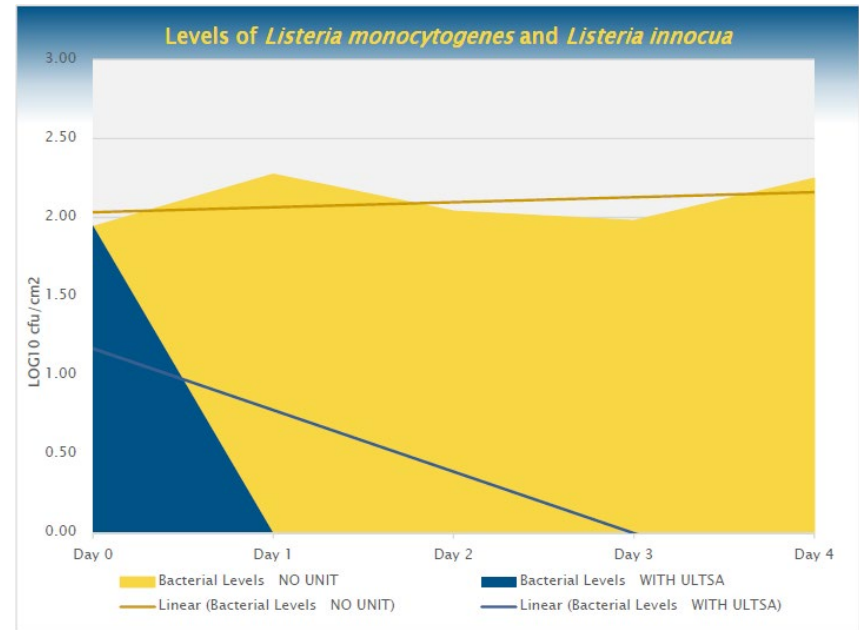
Pathogen	8 hours	24 hours	48 hours
E. Coli	79.60%	97.70%	99.90%
S. aureus	87.40%	91.10%	99.50%
C. difficile	91.40%	98.10%	99.60%



Testing Results

ALS - Listeria testing

- Testing on two common Listeria species, *Listeria monocytogenes* and *Listeria innocua* in a cold room environment
- Without HyGenikx, bacteria levels remained around 2 log cfu/cm²
- With HyGenikx, 0 log cfu/cm² within 24 hours
- All samples below detectable levels by day 3



Perishable Food Waste. Fruit & Vegetables.

THE PROBLEM...

An engineering solution
to help reduce food spoilage and avoid waste – to extend food life. Helping towards a better sustainable future.



Data shows that **half** of all fruits, vegetables and tubers are **wasted** in the supply chain.



produced: **1400 million tons**

15m tonnes of food is lost as consumers throw away **100 million tonnes** of edible food.

Accounting for **10% of all greenhouse gas emissions** are linked to food waste.

Food wastage would ease the pressure on natural resources as the world attempts to meet future demand.