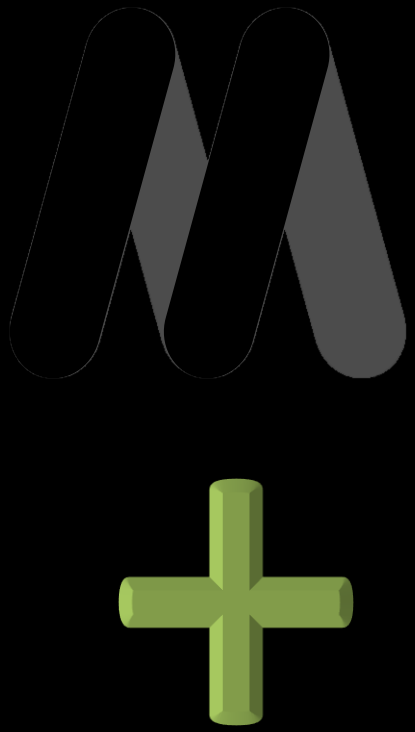
MECHLINE



HyGenikx – ALS Testing review.

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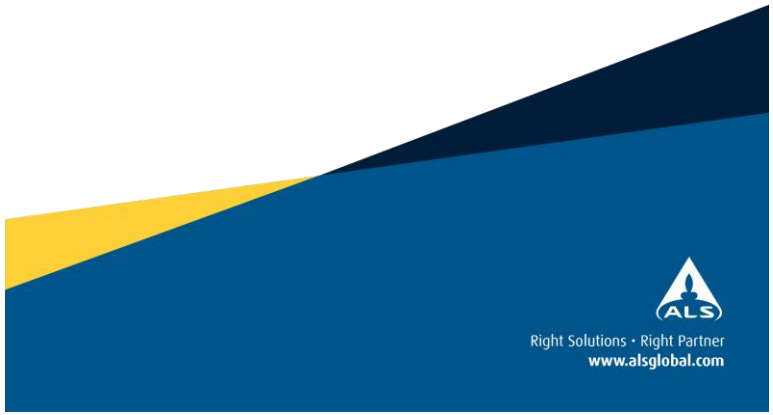
WATER GAS ENVIRONMENT PEST CONTROL

Food Life extension – Food Waste reduction - Independently tested

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 one of the world's largest and most diversified testing services providers, with sites strategically located around the world to provide accurate and timely services. ALS has operations in more than 350 locations, in 55 countries, and on six continents.

ALS Testing UK

Specialist foodservice / food laboratories

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

All ALS laboratories across the UK and Ireland are either UKAS or INAB accredited to ISO 17025 with other relevant accreditations in place.

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Executive Summary :

- 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 produce 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.
- The overall results showed a consistent increase in the shelf-life of the produce during the second phase of the trial (with the ASPU) **with an average increase of the shelf-life of 58.1%.**
- **The surface hygiene was found improved by ~45%** and levels of airborne contamination were found significantly reduced with the use of the ASPU.

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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?**

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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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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 :

- The above increase in the shelf life of the produce was matched by a decrease in the recorded levels of surface and air contamination**, with surface contamination displaying a ~45% decrease with the use of the ASPU**

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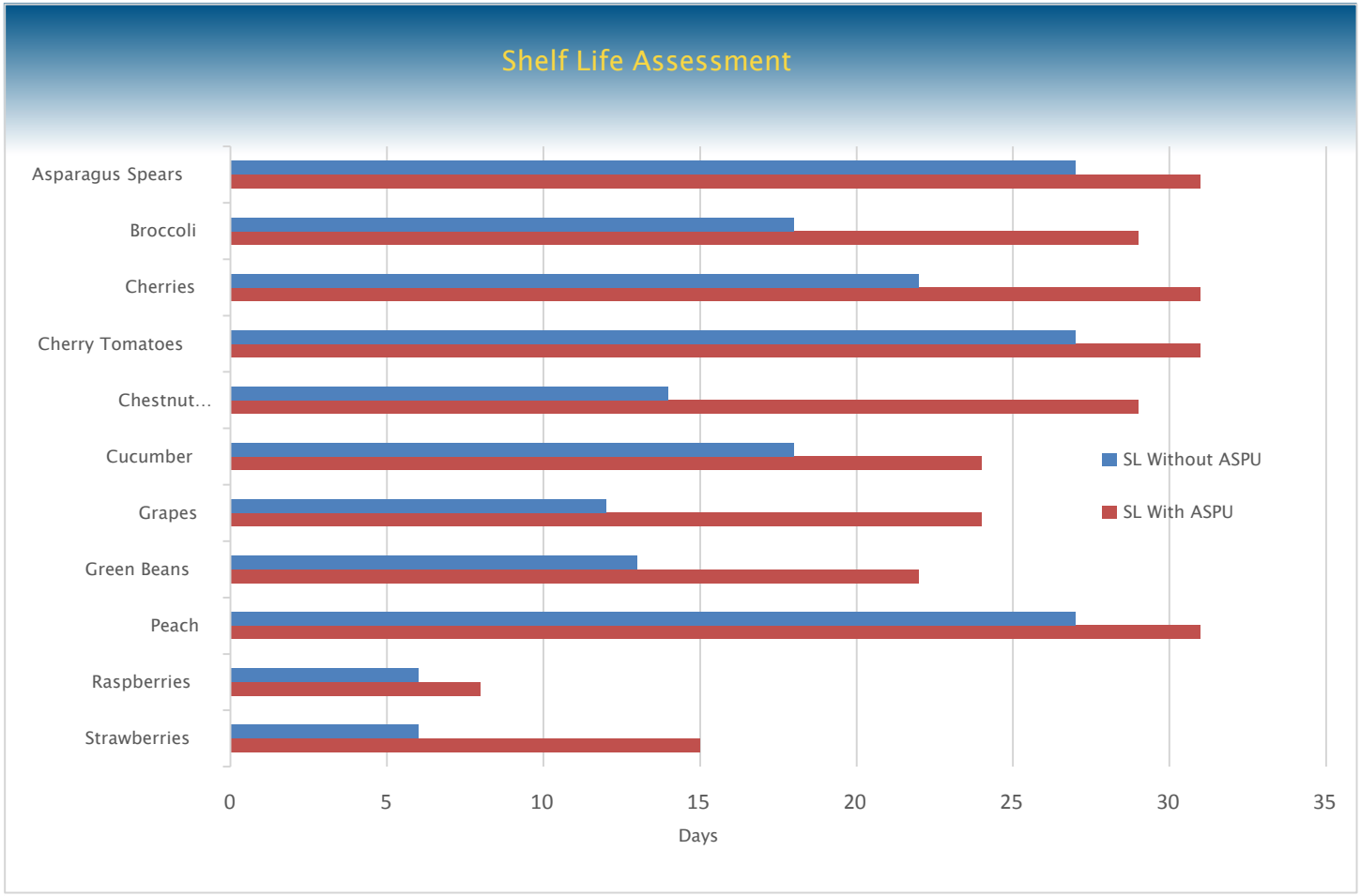
Shelf Life Assessment :



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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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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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ALS Conclusions :

- The validation project described in this report aimed at demonstrating the ability of a Hygenikx Air and Surface Purification Unit (ASPU) to prolong the life of produce stored in controlled conditions in a cold room and to improve its air and environmental conditions by abating levels of present microorganisms.
- 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).**
- **The above increase in the shelf life of the produce was matched by a decrease in the recorded levels of surface and air contamination, with surface contamination displaying a ~45% decrease with the use of the ASPU and air quality showing a marked decrease of microbial levels when compared with the data gathered from the cold room without the ASPU.**
- **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 discussed in this report.**

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Thank You

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