



POSTHARVEST TECHNOLOGY TRENDS

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POST-HARVEST SCIENCE AND TECHNOLOGY IS DESIGNED TO:



PRESERVE THE QUALITY AND CONDITION OF THE FRESH FRUIT,



ACHIEVE A LONGER USEFUL LIFE,



ALLOW A BETTER AND WIDER DISTRIBUTION OF THE PRODUCT



REDUCE LOSSES, LESS FOOD WASTE, HIGHER MARGIN! .

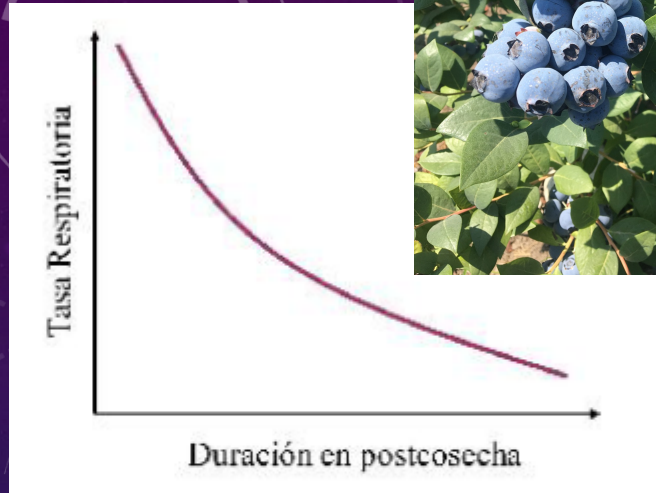


Technologies do not do magic, they only preserve the quality of the raw material!!!

For this reason, it is essential to arrive with a product in the best quality and condition possible, to the process at origin!

With any Postharvest technology that we apply, before, during or after packaging, we contribute to preserving quality and condition.

But it's only part of the process!!



Where should we direct our efforts today?

Traveling varieties with good postharvest:

Physiological variables: Respiratory rate and ethylene production rate.

What characteristics of varieties are we interested in

Variables of maturity, quality and condition

Firmness, color, rotting, soluble solids, titratable acidity,

disorders.

Response to technologies

UV Process
Line or
Chambers

Pallets
covers

Bags (Macro
and Micro),
AM,

SO₂
Gasification,
Generators

Process line
applications,
ultra low
volume

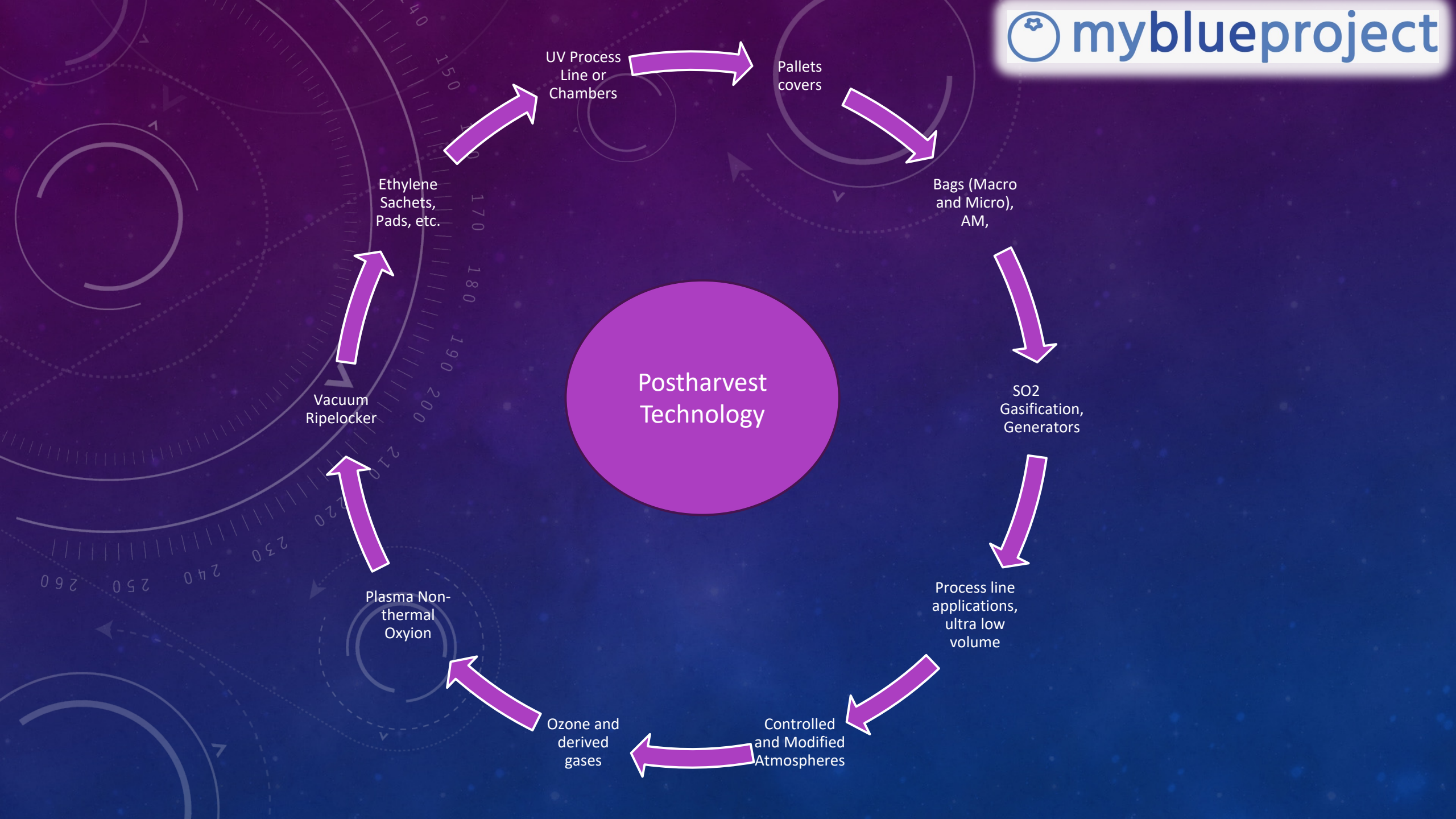
Controlled
and Modified
Atmospheres

Ozone and
derived
gases

Plasma Non-
thermal
Oxyion

Vacuum
Ripelocker

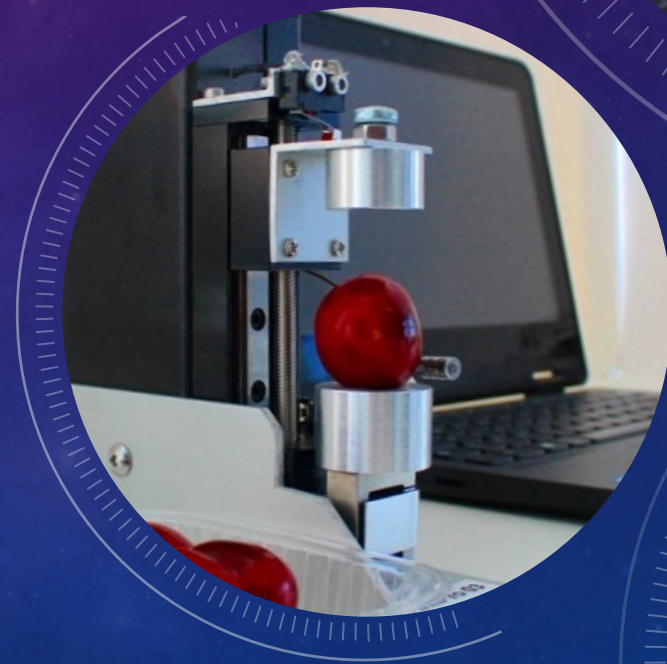
Ethylene
Sachets,
Pads, etc.



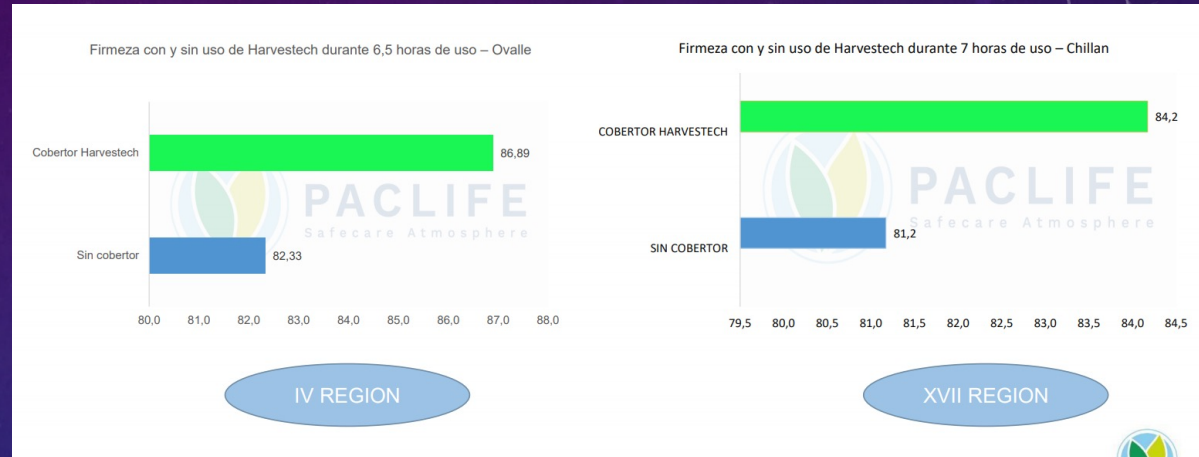


FIRMPRO

FIRMNESS

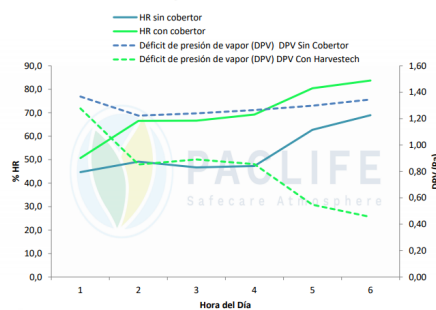


PALLET COVERS, BAGS

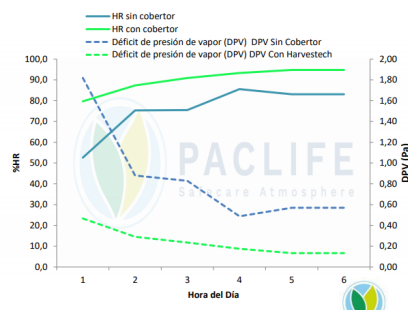


MENOR DPV CON USO DE COBERTORES HARVESTECH MOMENTO CRÍTICO DE DESHIDRATACIÓN

Porcentaje de menor DPV Hydrotech versus Sin Cobertor
Agrícola Sumonte- Talca



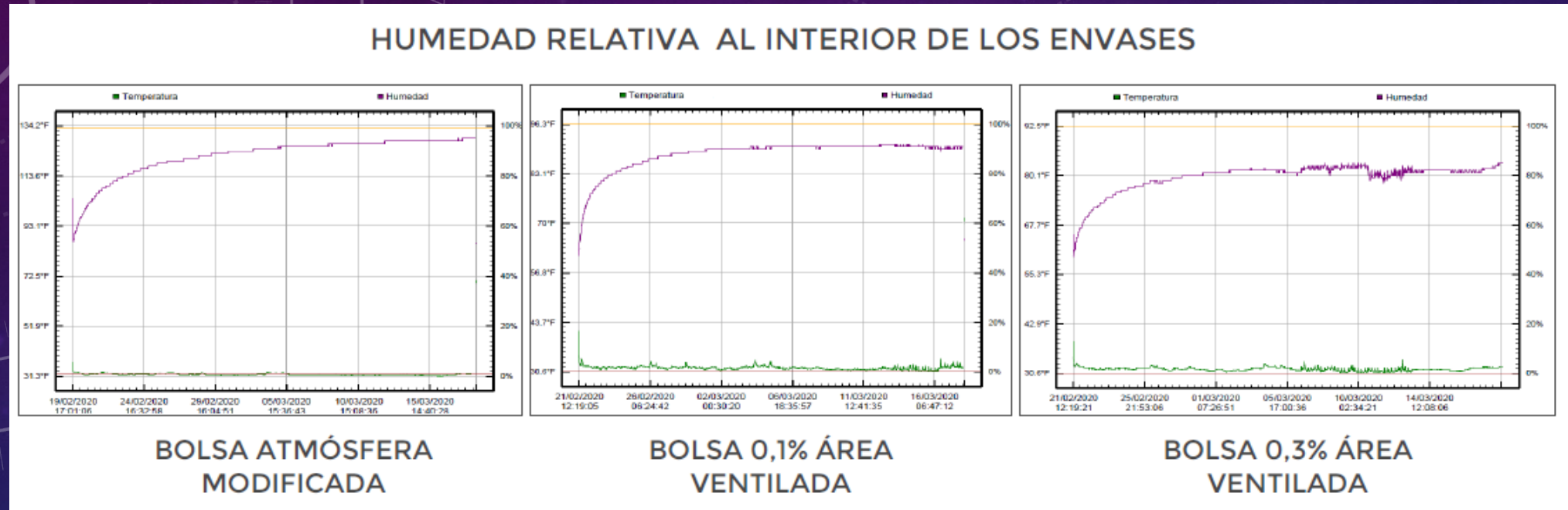
Porcentaje de menor DPV Hydrotech versus Sin Cobertor
Variedad Suzie Blue - Chillan ND



- Los cobertores **Harvestech** reduce hasta un 66% del DPV que se tendría sin cobertor durante 4 horas de su uso y sobre un 77% en 7 horas.



Relative humidity level inside bags with different ventilation during storage at 0°C for 30 days. Blueberries var. Draper. MBP, 2020



Complementary technologies to prevent the development of fungi.

Cooling time: The implementation of bags could have an impact on the cooling time, which must be previously evaluated.



Aspect to consider when using bags:

Higher humidity, favorable environment for the development of fungi.

(Palouet al.2002, J.L. Henríquez and S. Pinochet,2016)

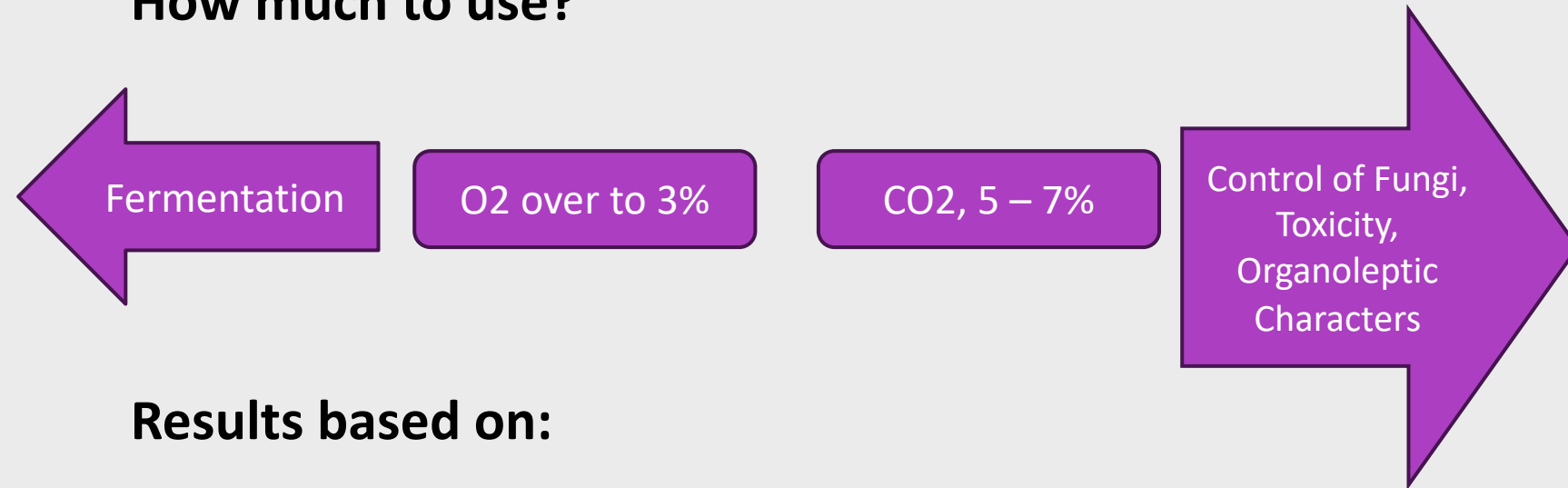
Complementary technologies to prevent the development of fungi.

Cooling time

The implementation of bags could have an impact on the cooling time, which must be previously evaluated.

Large number of formats, perforations, polyethylene, polyamides, etc.

Modified atmosphere How much to use?



Results based on:

-  **Gas Levels**
-  **Variety and Harvest Status**
-  **Temperature**
-  **Storage time**
-  **Exhibition time**

- ❖ High CO₂ and Low O₂, decrease the metabolism of the fruit

- ❖ Reduces Fungal Growth

- ❖ Dehydration Control

- ❖ What levels cause toxicity?

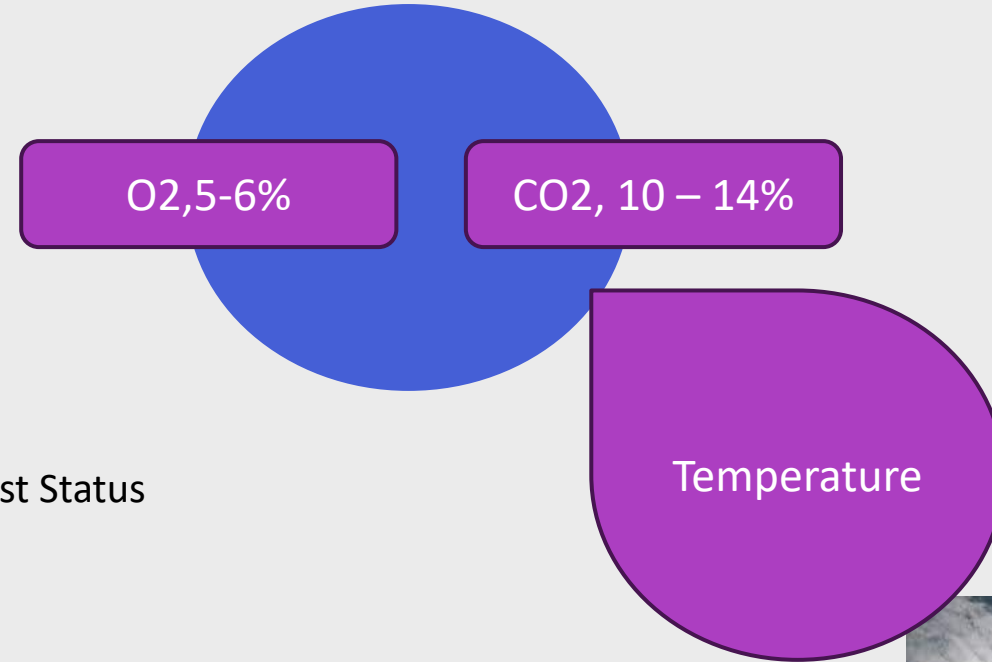
- ❖ Variety, Concentration vs Time, Oxygen level

- ❖ Depends on the temperature: thermal breaks, condensation,

- ❖ Large number of formats, perforations, polyethylene, polyamides, etc.

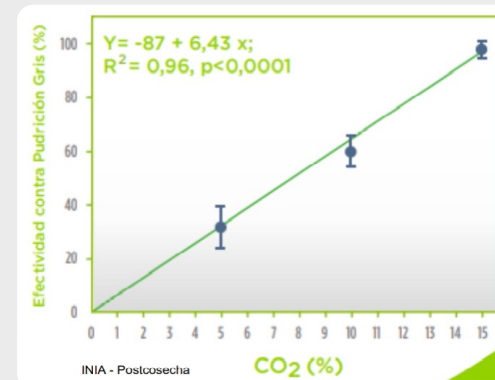
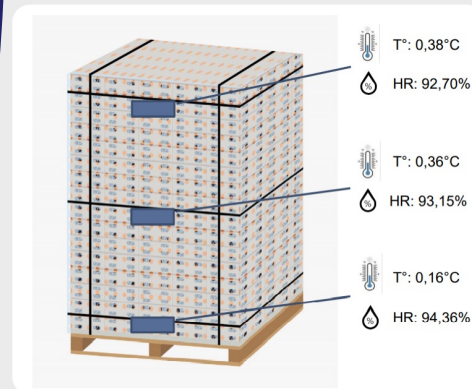
Controlled atmosphere, reefer container

- ❖ Controlled Atmosphere Containers
- ❖ HIGH CO2 ATMOSPHERES ARE VERY EFFECTIVE IN CONTROLLING BOTRYTIS (Cantin, 2012)
- ❖ Not with AM Bag Perforated Bag, Perforated Cap
- ❖ When??: Organic fruit, High pressure of botrytis, post rain

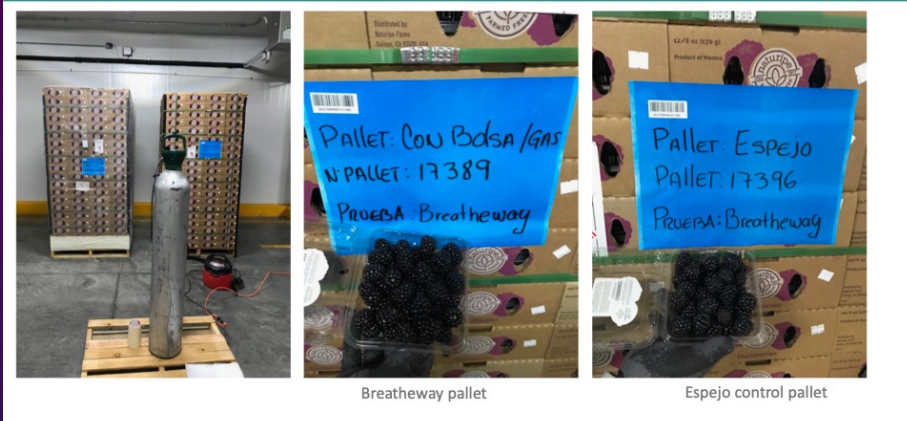


Results based on:

- ❖ Variety and Harvest Status
- ❖ Temperature
- ❖ Storage time
- ❖ Exposition time
- ❖ Independent of environmental factors
- ❖ Remote control, real time



BRETHAWAY



Data : Brethaway 2021

SO₂ APPLICATION IN GASIFICATION CHAMBERS



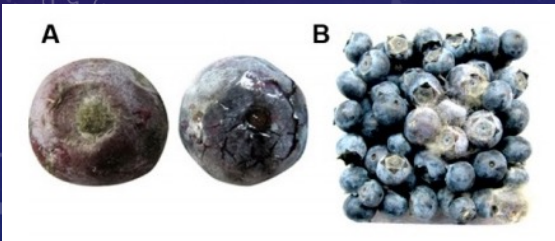
It can reduce the incidence of Botrytis by up to 90% (Rivera, 2013)



Does not act on latent infections (Smilanick et al., 1990)



Effectiveness is influenced by temperature and Relative Humidity

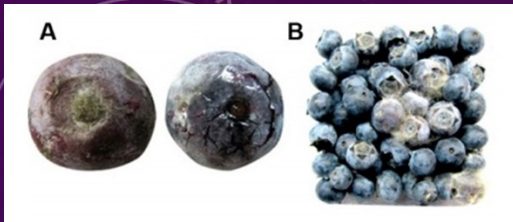


Use of SO₂ after harvest to complement Rot control.





Before or after packaging due to the use of SO₂ generators or bags with a built-in generator, pallet caps, etc.

SO2 GENERATORS



 EFFECTIVE FOR THE CONTROL OF BOTRYTIS
(Maroisset al., 1986; Smilanick et al., 1990; Smilanick and Henderson, 1992)

 Use of generators + perforated bags; sheets for pallet + Caps; Bags with SO₂ incorporated.

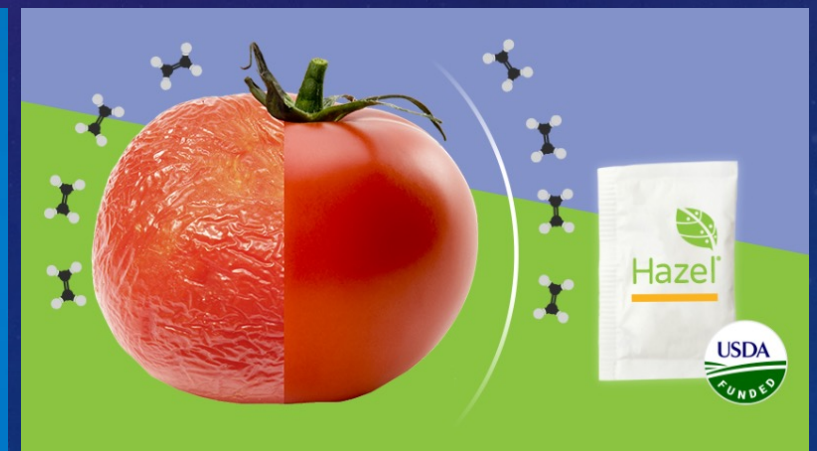
 It acts on latent infections, conidia that were not suppressed with gasification
Low concentrations and persistent over time, sheets of sodium metabisulfite.

Ensure adequate SO₂ supply to inhibit the development of mycelium



1-MCP ; Permanganate, clays, pads with essential oils.

They exercise control but in low proportion;
His focus is different.
They have been evaluated on blueberries,



Vacuum, Ripelocker

Single Control System (pump/sensors/manifold) operates up to 20 RipeLocker chambers

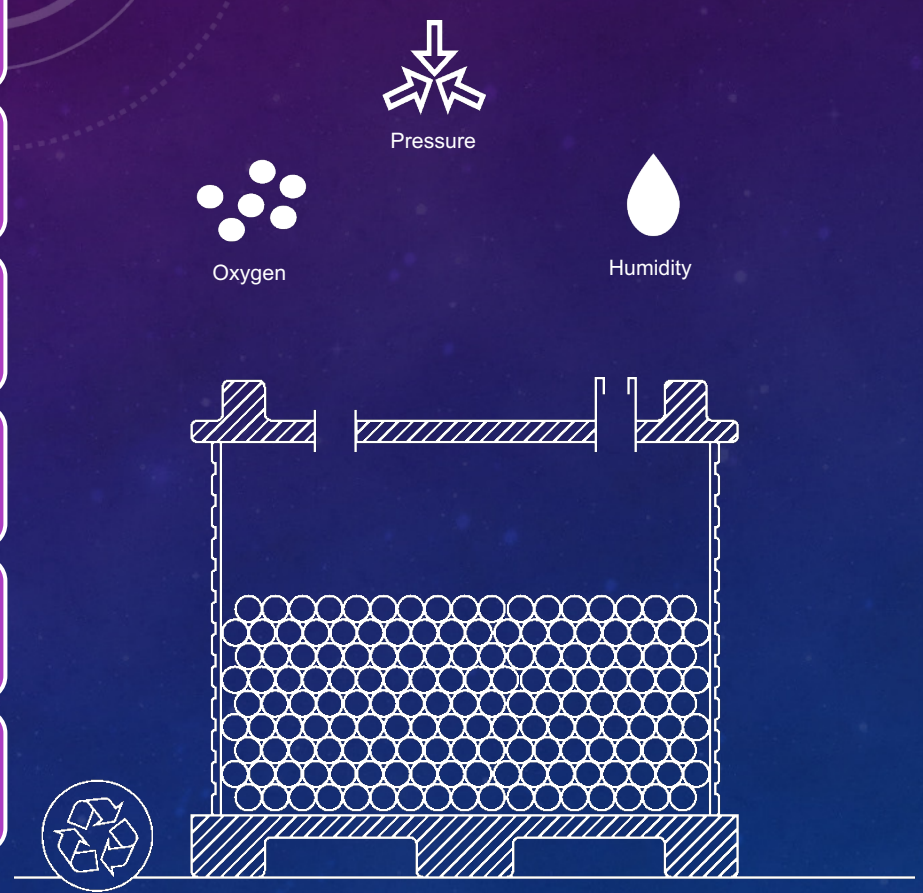
RipeLocker sets independent “floors” and “ceilings” for Pressure, O₂, and CO₂

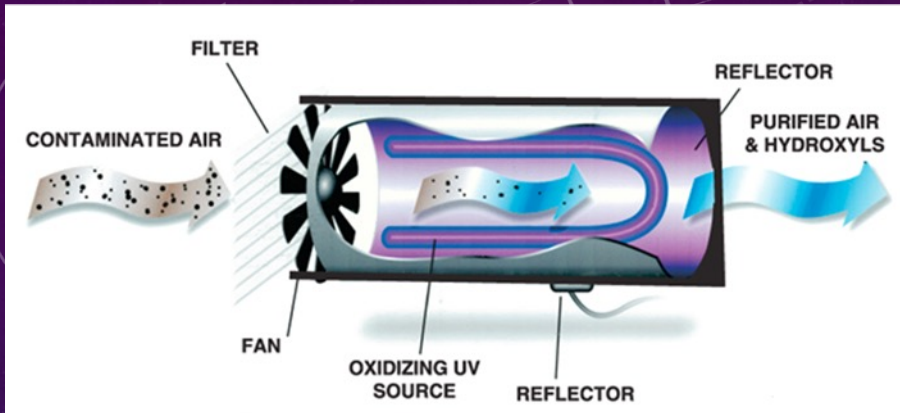
Oxygenation and pumping only occur when an individual RipeLocker is “out-of-bounds”

Air is drawn out of the chamber creating a low-oxygen and low-pressure environment

Respiration of the perishable is slowed to the maximum level, without going anaerobic

The high humidity inside the chamber remains as a fully saturated vapor, alleviating weight loss





Ozone, hydroxyl generation

Contaminated air is directed into the chamber where ambient humidity, multi-nanometer wavelengths and frequencies combine to create an oxidizing formula and produce hydroxyls.

Once the hydroxyls are created, they are sent out to "seek and destroy" odor molecules, bacteria, viruses, mold, volatile organic compounds (VOCs), and other chemicals. Hydroxyls simultaneously decontaminate the air, surfaces and objects.



Precooling



Packing Line Cool Room



Non-Thermal Plasma, Oxyion

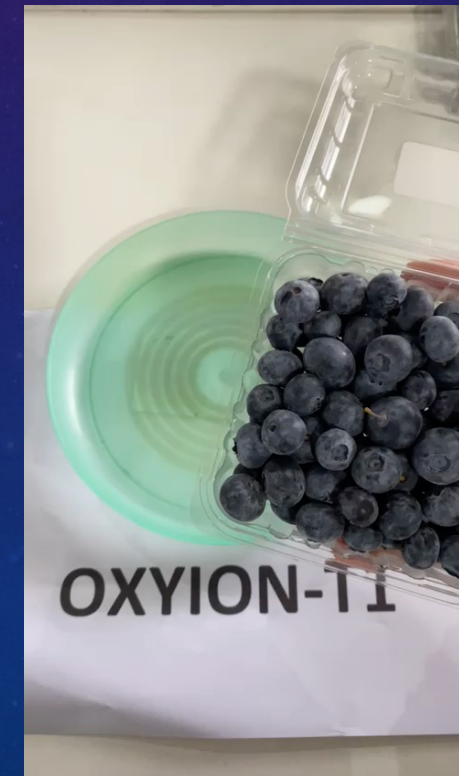
Oxyion is a unique Non-Thermal Plasma Technology (NTP) that generates 7 different compounds, including Hydrogen Peroxide,

Without the use of chemicals and without leaving residues



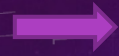
30 days after insufflation with Oxyion

- ✓ Firmer blueberries (instrumental measurement)
- ✓ Lower incidence of soft and sensitive fruits
- ✓ less dehydration
- ✓ Al menos 10 puntos de diferencia de firmeza





Protecting Covers



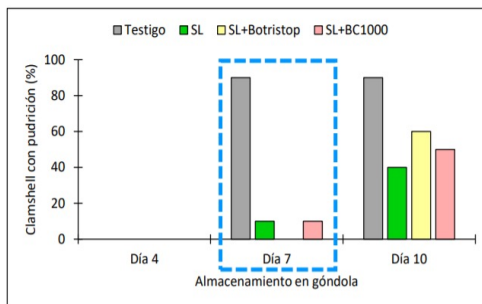
Protective waxes, reduce dehydration and prolong postharvest life.



natural ; Shel-Life ; Vitafresh Botanicals, Naturcover artificial; based on resins



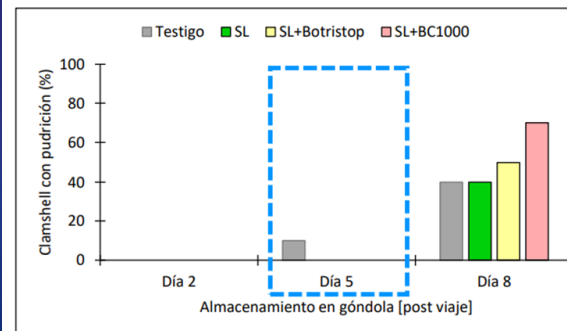
Frutillas en Clamshell



Frutillas Testigo: 90% de pudrición al día 7 en góndola.

Frutillas con Shel-Life®: Redujeron la pudrición a 0-10% después de 7 en góndola.

Frutillas en Clamshell



Frutillas Testigo: 10% de pudrición a los 5 días.

Frutillas con Shel-Life®: SIN pudrición después de 5 días en góndola.



FullCover: ultra-low volume electrostatic sprayer, for the application of fungicides and other inputs in post-harvest.



As it is an ultra-low volume application: it does not wet the fruit, it dries in seconds and does not remove bloom.



CONVENTIONAL FUNGICIDES



BIOLOGICAL AND ORGANIC FUNGICIDES



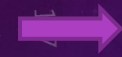
ORGANIC COVER



Figura 2-1-3. Lámparas de luz UV-C



UV light, The effectiveness of UV-C light treatment on fruit is subject to certain factors:



Dose used, light source, species, cultivar, geometry and surface characteristics of the fruits.



The treatments must be carefully evaluated in such a way that the irradiation dose applied minimizes the microbiological load, does not generate negative effects on the sensory properties of the product and, to the extent possible, improves the nutritional and functional characteristics of the food.

Germicidal effect of the wavelengths of the ultraviolet spectrum.

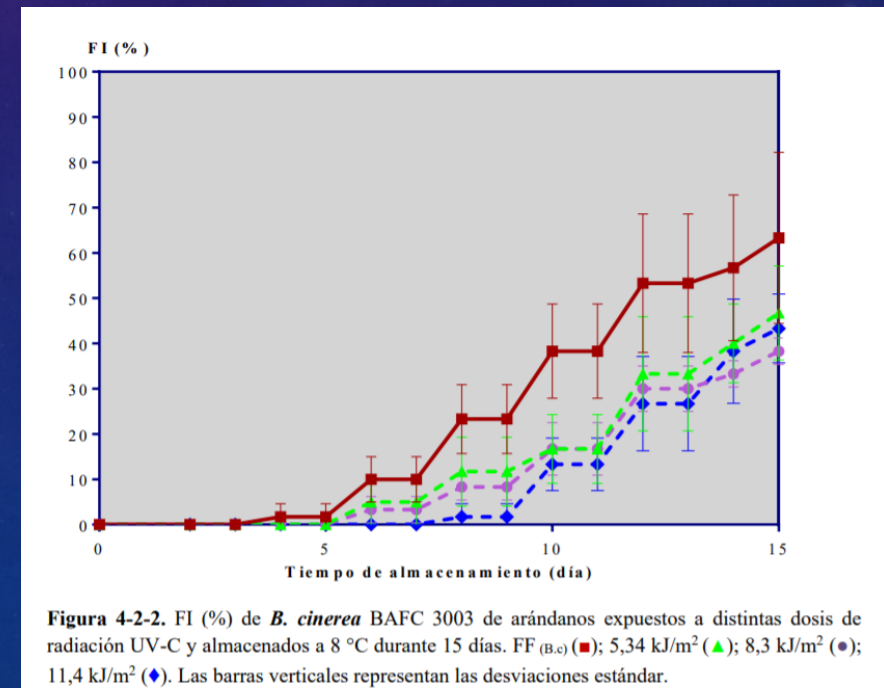
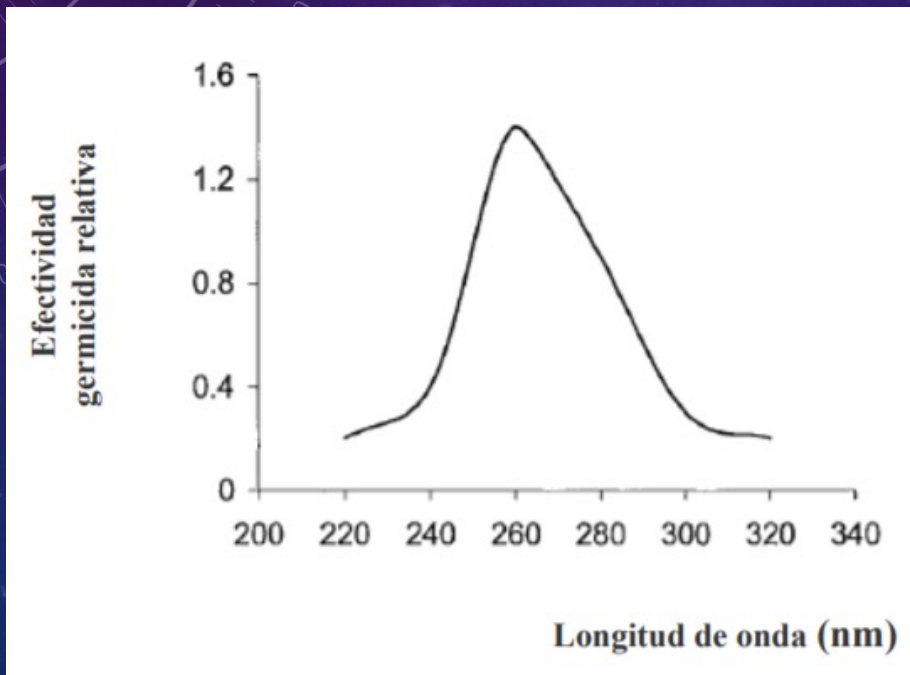


Figura 4-2-2. FI (%) de *B. cinerea* BAFC 3003 de arándanos expuestos a distintas dosis de radiación UV-C y almacenados a 8 °C durante 15 días. FF (B.C) (■); 5,34 kJ/m² (▲); 8,3 kJ/m² (●); 11,4 kJ/m² (◆). Las barras verticales representan las desviaciones estándar.

Jaramillo et al, 2019

Conclusion



We must be able to maintain consistency throughout the season to meet what end customers want to consume, and thus generate loyalty to return for a quality and condition product!



Today consumers flow throughout the season from one origin to another, they know at what time of the year a given origin delivers the standards they desire.



They don't just buy blueberries for being blueberries, they buy an experience!!!

There are a variety of technologies that by themselves or in combination generate benefits to obtain arrivals in quality and condition, that meet what consumers are looking for and that make us competitive.



These technologies do not generate benefits by themselves, they depend on the raw materials we have.



Thank you!

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