

POST
HARVEST
_CARE

extending
shelf-life

by **BON**

APPLE



Introduction to the study

Objective

Demostrar los beneficios de eliminar el etileno mediante los sistemas de Bioconservacion

Methodology

Tests in commercial and pilot chambers

Apple variety

Bramley, Royal Gala, Pink Lady, Gramy Smith, Ariane

Study conducted by

CTIFL (France), IRTA (Spain), ICA storage (UK)



Apples are the fruit with the **highest post-harvest storage capacity**

It is also the fruit that produces the **highest amount of ethylene.**



Conventional ethylene absorption systems in preservation chambers **are not sufficient** to absorb these high quantities of ethylene.

Effects of ethylene

- **Softening** and loss of firmness
- **Over ripening** and senescence
- Increased risk of **blanching**
- Increased risk of **internal browning**
- Increased **incidence of rotting**
- **Wilt**
- **Weight loss**

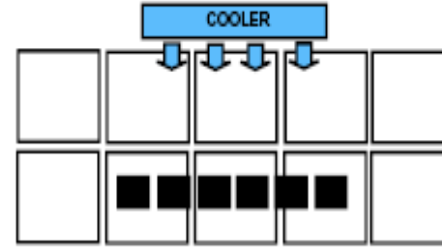


STO12 Modules / STO12 Filters

It is a **flexible solution**, the number of units will **depend on the ethylene emission** (variety, quantity, time, atmosphere).

These are self-contained, **single-use filtering units** used for **ethylene removal** when large quantities of granules are required.

They are installed in the chamber in front of the evaporator.



Bramley Apple

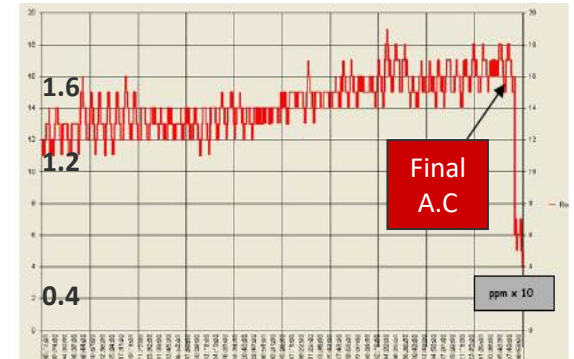
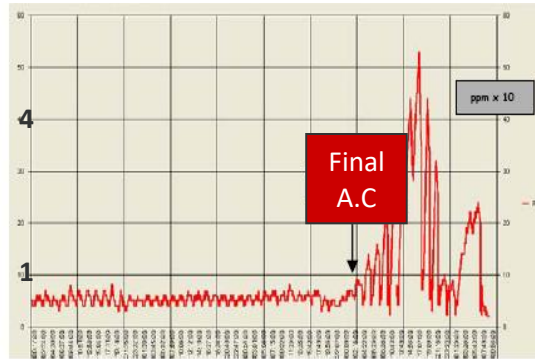


- ICA (UK) July, 2008
- Conditions: 9 months at 4.5°C and AC(1% O₂, 5% CO₂)
- Chamber: 380 m³ and 85 Tn of fruit

Apples preserved with **BION**, unlike SmartFresh, recover their **capacity to produce ethylene** when the C.A. is broken.

BION

SmartFresh



BION vs SmartFresh

- Better ethylene control
- 50% less rotting
- Similar hardness
- Similar internal ethylene (30 ppb)
- Better fruit quality



Royal Gala Apple

- IRTA, Costabrava (Spain), 2011
- Conditions: 4.5 months at °C and AC (1.5 - 1.8 % O₂; 1.0 - 1.3 % CO₂; 0.3 - 1.0 °C).
- Chamber: 1000 m³ and 220 Tn of fruit

Test with internal ETH machine prototype:

- Ethylene measurement
- Apple quality inspection



Ethylene concentration: **< 0.2 ppm throughout storage.**
Commercial apple firmness: **6.1 kg (initial 7.5 kg).**

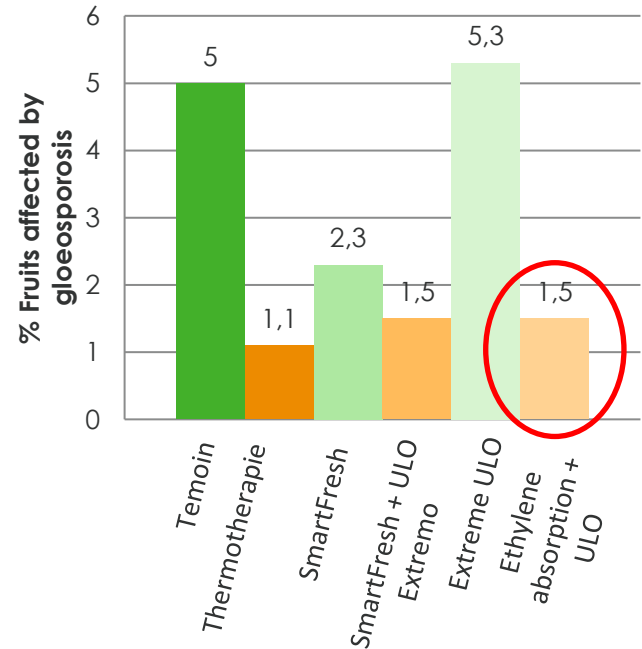
Pink Lady Apple



BION in ULO atmospheres:

- **Effectively** reduced **gloeosporosis**.
- **Prevented** the appearance of **scald**.

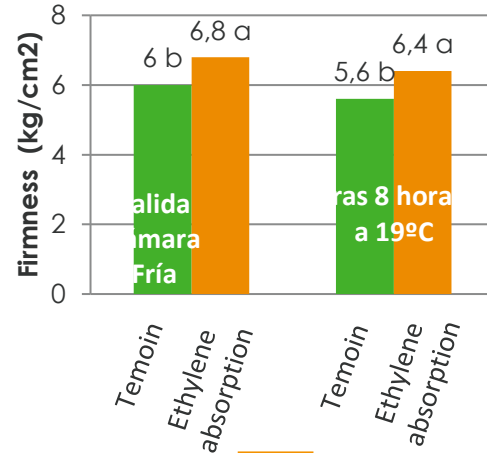
- Ctifl/ CEFEL (France) Dr. Monteils and Dr. Westercamp, 2012. Small scale assay.
- Conditions: Apple at 0.5 - 1 °C, AC (2.2 % O₂ and 1.5 %CO₂) and ULO (1.2% O₂ and 1% CO₂) for 7 months.



Pink Lady Apple



- Ctifl/ CEFEL (France) Dr. Monteils and Dr. Westercamp, 2008.
- Conditions: 5 months at 0.5 °C, AC (2.2 % O₂ and 1.5% CO₂).
- Small scale trial.



Pink Lady Apple



BION in ULO atmosphere:

Prevented the appearance of **blanching and internal browning**.

Reduced **gloeosporosis**.

Maintained firmness.

Slowed down color evolution.

Modalities	Background color of fruits	
	Cold Chamber Output	After 8h at 19°C
Temoin	4,6 a	4,7 a
Ethylene absorption	4,4 b	4,5 b

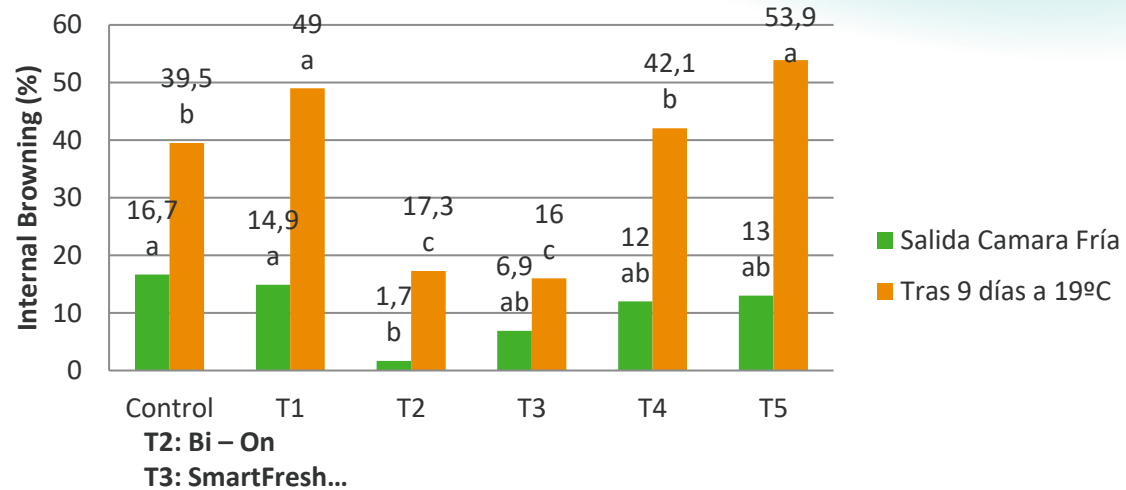
Pink Lady Apple



BION :

- Reduced internal browning more effectively than other systems.
- Prevented the appearance of blanching and maintained firmness.

- Ctifl/ CEFEL (France) Dr. Monteils and Dr. Westercamp, 2006.
- Conditions: 5 months at 0.5 °C, AC (2 % O₂ and 1.8% CO₂).
- Small scale trial.



Granny Smith Apple

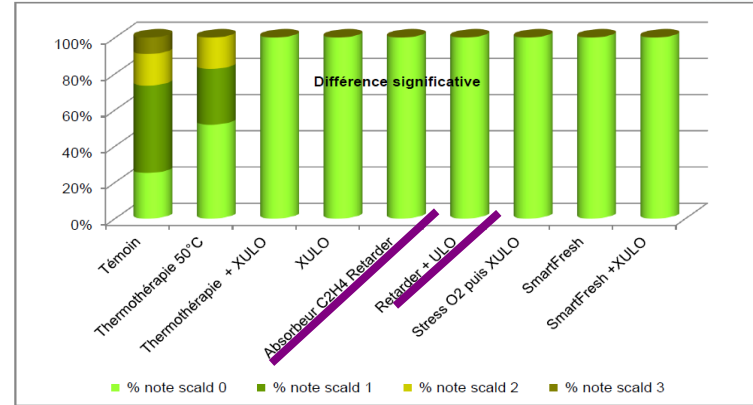


BION in both CA and ULO:

Reduced internal browning more effectively than other systems.

Prevented the occurrence of **blanching and maintained firmness**.

Blanching (%) after 8 days at T=19°C



- Ctif/ CEFEL (France) Dr. Monteils and Dr. Westercamp, 2012.
- Conditions: 5 months at 0.5 °C, AC (2.5 % O₂ and 1% CO₂) and ULO (1.2 % O₂ and 0.8 % CO₂).
- Small-scale study.

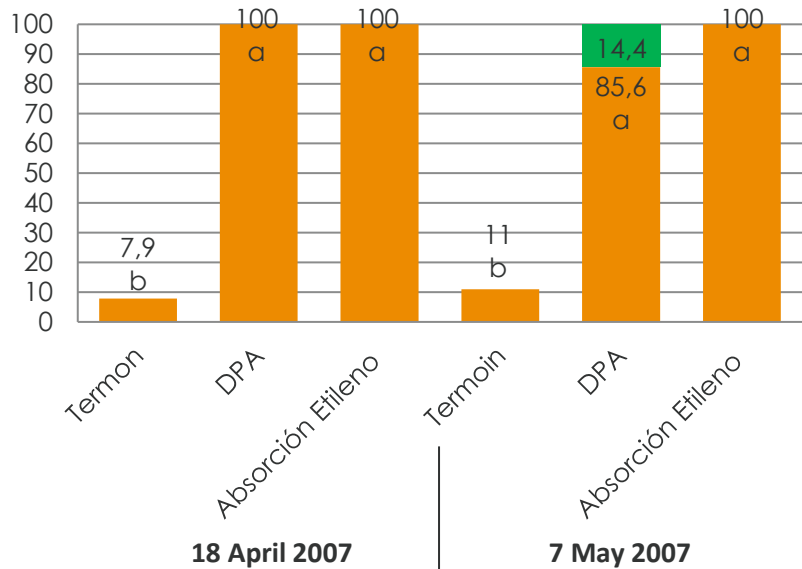
Granny Smith Apple



BION:

- **Prevented** the appearance of **scald** better than DPA.
- **Maintained firmness.**

- Ctifl/ CEFEL (France) Dr. Monteils and Dr. Westercamp, 2012.
- Conditions: 5 Fruit at 0.5 °C, AC (2 % O₂ and 1.8 % CO₂) for 6 and 7 months.
- Small scale trial.

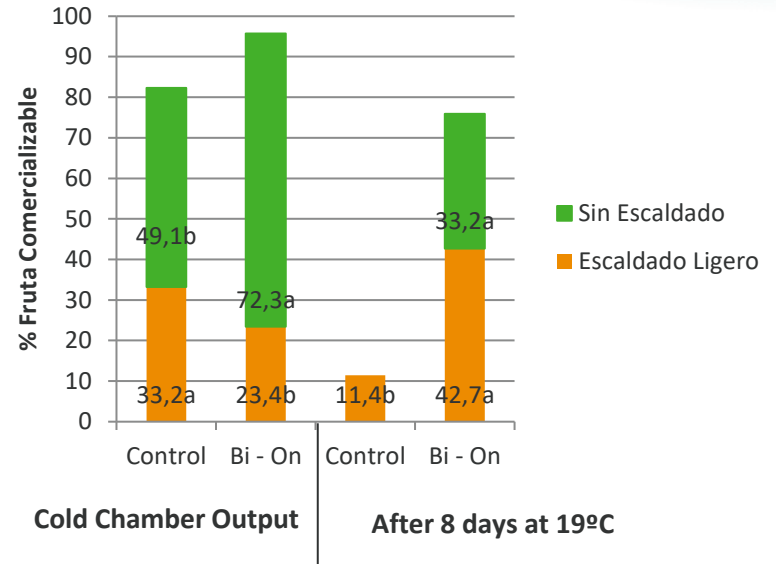


Granny Smith Apple



BION clearly, **reduced blanching** 85% more marketable fruit than the control group.

- Ctifl/ CEFEL (France) Dr. Monteils and Dr. Westercamp, 2005.
- Conditions: Fruit at 0.5 °C, AC (2.5 % O₂ and 2% CO₂).
- Blanching measurement: at the exit of the chamber and after 8 days at 19°C.
- Small scale trial.



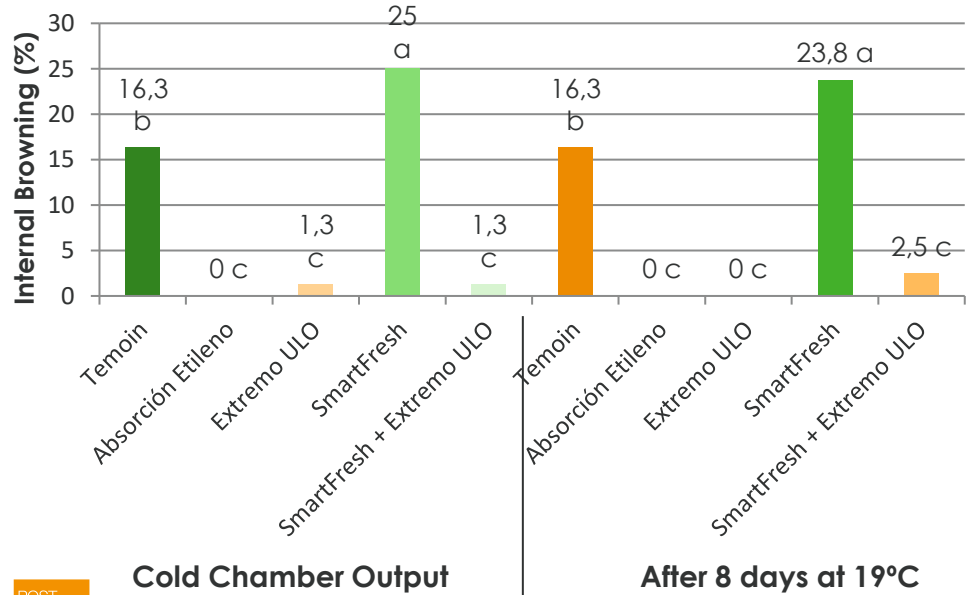
Ariane Apple



BION:

- **Reduced internal browning** more effectively than other systems.
- **Maintained firmness.**

- Ctifl/ CEFEL (France) Dr. Monteils and Dr. Westercamp, 2012.
- Conditions: Fruit at 0.5 - 1 °C and AC (2.5 % O₂ and 1% CO₂) for 9 months.
- Small scale trial.



BION Advantages

Independent studies show that **BION**

- Maintains **firmness**.
- Slows down **color evolution**.
- **Reduces gloeosporiosis**.
- Reduces the **risk of blanching**.
- Reduces **internal browning**.

In **apple preservation**:

(Bramley, Gala, Pink Lady, Granny Smith and Ariane)



Solutions for the effective removal of high ethylene concentrations

Produced during long apple storage in CA

STO12
modules

BION
Media

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THANK YOU

