POST
HARVEST
_CARE

extending
shelf-life
by BIOON

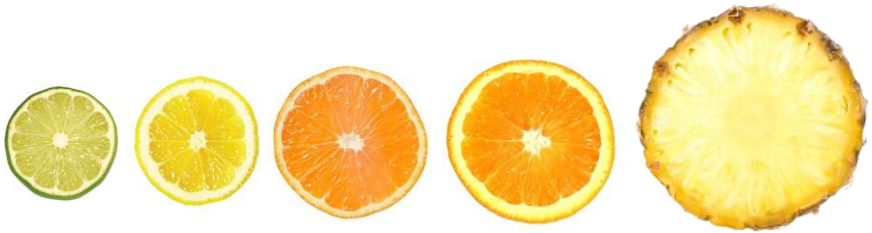
PINEAPPLE AND CITRUS

Pineapple, citrus fruits and ethylene

Citrus and **pineapples** are **non-climacteric** fruits susceptible to different pathologies related to **air quality (ethylene, VOCs and fungal spores)** that reduce their postharvest life.

Ethylene effects

- Non-climacteric fruit; ethylene **stimulates senescence** (skin aging).
- Increased **risk of fungal infections** (degreened fruit).
- **Increased ethylene production** from rotten fruit.
- Aggravation of **chilling injury** as fruit is sensitive.
- **Yellowing** of green citrus (limes).



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Ethylene effects

Low ethylene levels delay **senescence** of non-climacteric fruits and vegetables.

Postharvest life of late Valencia orange was **60%** longer at **< 0.005 ppm** ethylene than at **0.1 ppm** (80 days vs. 129).

High abscission enzyme activity predisposes oranges to ***Diplodia natalensis*** invasion during **degreening with ethylene.**

50 ppm and **2 ppm**

Ethylene effects

UC Davis explicitly recommends **eliminating ethylene** during **transport and storage** to reduce the **degree of senescence and damage** in lemons, mandarins, pomegranates and pineapples.

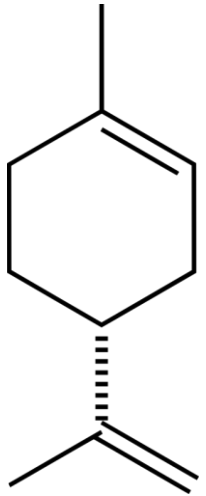
COVs effects

- Microbial populations communicate with each other and with their hosts by emitting and detecting small diffusing compounds **(gaseous signals).**
- Evaluation of **volatile emissions** as a **language of communication** between plants and the environment is gaining increasing interest.

COVs effects

- Germination of ***Penicillium digitatum*** **(green mold)** spores is induced by the mixture of volatile **limonene, acetaldehyde and ethanol** produced by wounded orange peel.

- Rodriguez et al (2011) suggest that when **limonene** reaches a peak due to fruit ripening, it becomes a **signal for attraction of pests** (Ceratitis capitata) and **pathogens** (Penicillium digitatum and Xanthomonas citri) that facilitates access to the fruit for consumption and seed dispersal.



New product: BION CPB

- Formulation with **enhanced activity** against **high molecular weight COV's** such as limonene.
- Recommended for protection of citrus and pineapple during transport.
- Planned trials:
- - Penicillium **spore retention evaluation.**
- - **Limonene and acetaldehyde** absorption capacity tests.
- - Efficacy on **pineapple**

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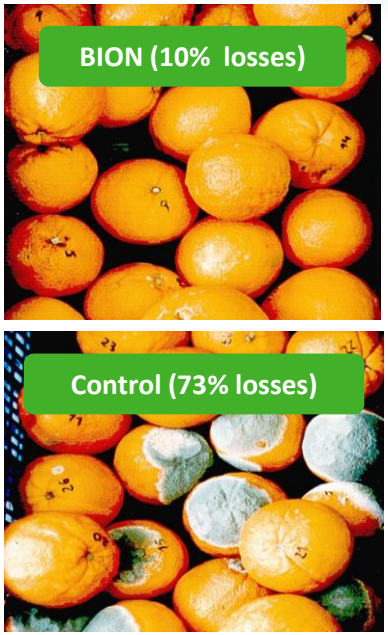
BION trials in citrus

The efficacy of **BION** in citrus has been demonstrated in different **independent trials and field tests.**

BION reduces:

- **Rot** caused by Penicillium sp.
- **Respiration** rate.
- **Weight** losses.
- **Acidity** losses.
- **Yellowing** in green citrus.
- **Chilling injury** in sensitive cultivars.



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extending shelf-life by BION

BION Trial: Tangerines

The effects of **BION** on the **disinfection of citrus chambers** were:

- Fortune and Hernandina **mandarins** (unwaxed, disinfected and with artificial wounds) were stored for **2 weeks in chambers at 3ºC** with and without the Ethylclean system. The evaluation was carried out after 7 days at 20ºC under aseptic conditions.

- **BION reduced by 68%** the incidence of **rots** (Penicillium digitatum + p italicum) caused by environmental contamination in the chamber.

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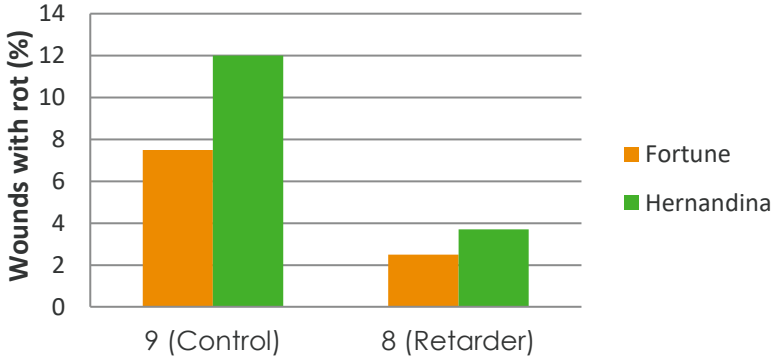
BION Trial: Tangerines

BION **reduced** the incidence of **rot** **(68%)** caused by environmental contamination inside the chamber.

Effect of Retarder equipment on the incidence of rotting caused by environmental contamination.



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BION Trial: Oranges and Tangerines

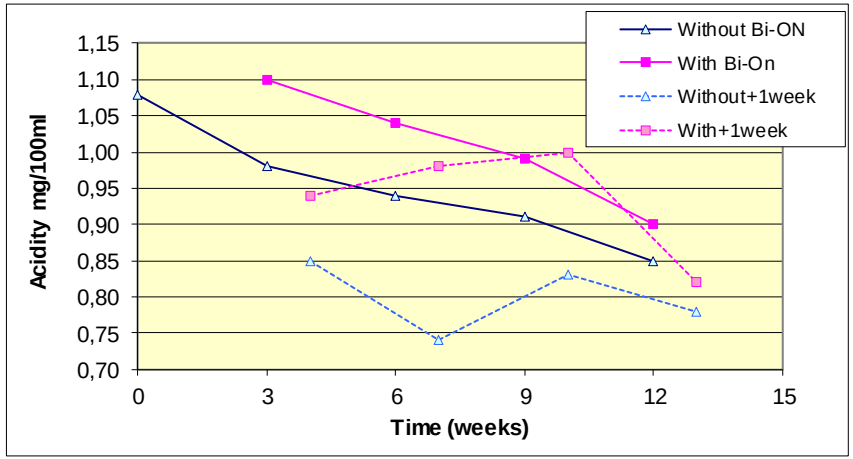
Effects of **BION** on citrus fruit preservation IATA (1997):

- Clementines from Nules, Navelina Orange and Valencia Late Orange (unwaxed) were stored at **2-3ºC for 8, 12 and 16 weeks** respectively with and without Ethylclean.
- Significant **reductions** were obtained in:

- **Rot** in the 3 fruits and especially in oranges.
- **Breathing rate** in Navelina and Clementine.
- **Loss of acidity** in Navelina.
- **Weight loss** in Valencia Late

BION Trial: Navel orange

BION reduces acidity loss and rotting.



Navelina oranges stored 3,6,9 and 12 weeks at 2-3ºC and then 20 days at 20ºC.

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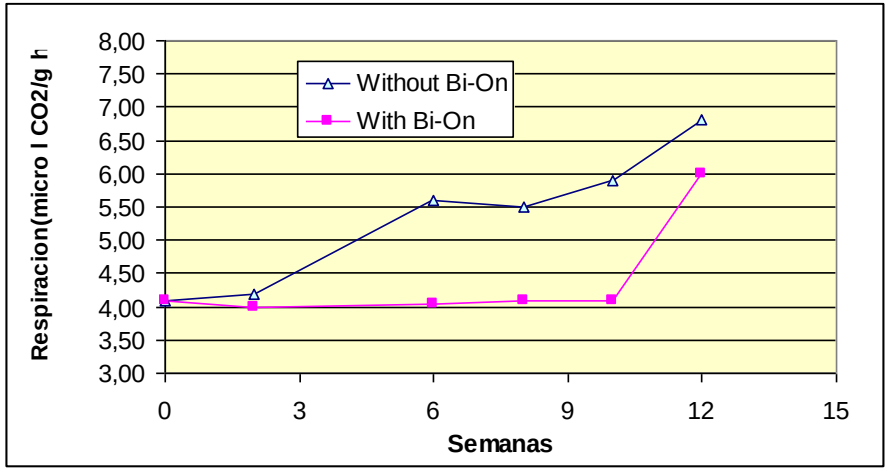
BION Trial: Clementines

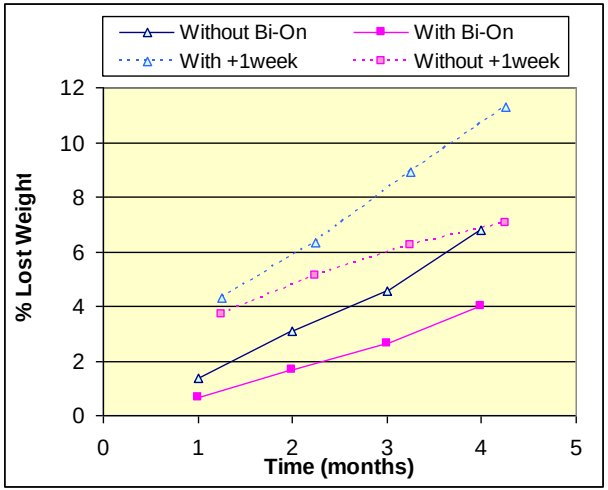
BION reduces respiration and rotting.



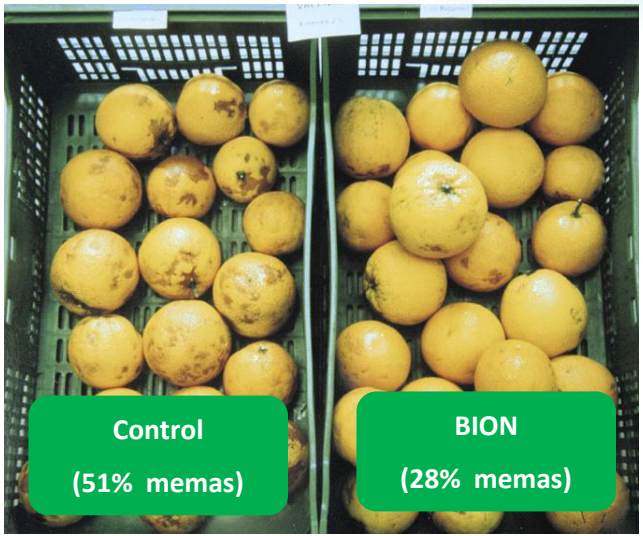
Clementines stored 3,6,9 and 12 weeks at 2-3ºC and then 20 days at 20ºC.

BION Trial: Valencia Late Orange

BION reduces weight loss and rotting



Valencia Late Oranges canned 4, 8, 12 and 16 weeks at 2-3ºC and then 20 days at 20ºC.



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BION Trial: Lemon

BION reduces senescence and the incidence of **rots.**

Stored (days)	With BION	Without BION	Reduction of shrinkage
14	0,56	0,83	33%
28	1,14	1,96	42%
42	2,18	5,34	57%
56	4,94	11,42	59%

Waxed fruit. Chamber with 4 ETH 1500 machines; automatic ventilation systems disconnected to keep the air purified inside.

BION Trial: Pineapples

The efficacy of **BION** on pineapples has been demonstrated in different field studies and is supported by our experience.

BION reduces:

- **Rot**
- **Weight loss**
- **Acidity**
- **Softening**
- **Yellowing**
- **Cold damage** (internal blistering).

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THANK YOU