Pineapple & Citrus

POST HARVEST _CARE

extending shelf-life by BION

BION

We improve air

Pineapple, Citrus & Ethylene

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extending shelf-life by BIOCON

Citrus and **pineapples** are **non climacteric fruit** vulnerable to various diseases related to **air quality** (**ethylene**, **VOCs** and **fungal spores**) that reduce their postharvest life.

Ethylene Effects

- Non- climacteric fruit; ethylene **stimulates senescence** (skin deterioration).
- Increases **risk of fungal infection** (degreened fruit).
- **Produces more ethylene** because of rotten fruit.
- Aggravated **chilling injury symptoms** because the fruit is sensitive.
- **Yellowing** of the green citrus (limes)

Literature Ethylene

Importance of the **low ethylene levels** to delay **senescence** of non-climacteric fruits and vegetables.

- The storage life of orange valencia late at **< 0,005 ppm** of ethylene was about **60%** of that held at **0,1 ppm** (80 days vs 129)

Enhanced activity of abscission enzymes predisposes oranges to invasion by ***Diplodia natalensis*** during **ethylene degreening**.

- **50 ppm** and **2 ppm**

(Wills et al 1999)/(Brown and Burns 1998)

Literature Ethylene

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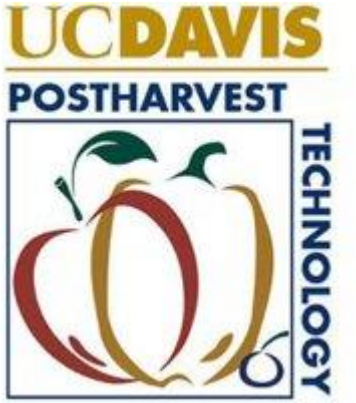


UC Davis recommends explicitly to **remove ethylene** from **transport** vehicles and **storage** facilities to reduce the **rate of senescence and decay incidence.**

Effects of VOC's

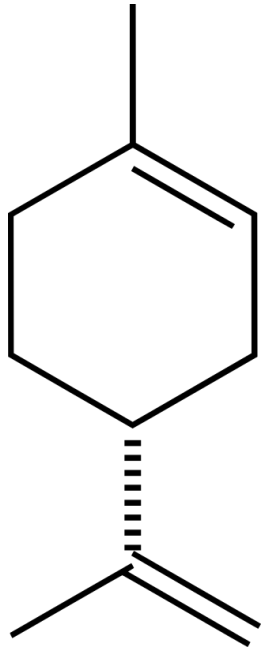
- Microbial populations communicate with each other and their hosts by emitting and detecting small diffusing compounds (**gas signalling**).

- Evaluating **volatile emissions** as a **language for communication** between plants and the environment is gaining increasing interest.

Effects of COVs

- The germination of the spores of the ***Penicillium digitatum*** (**green mould**) is induced by the mixture of volatiles **limonene, acetaldehyde** and **ethanol** produced by the skin of wounded oranges.

- Rodriguez et al (2011) suggest that when **limonene** reaches peak levels as the fruit develops, it becomes a **signal for pest**(*Ceratitis capitata*) and **pathogen attraction** (*Penicillium digitatum and Xanthomonas citri*), which facilitate access to the fruit for pulp consumers and seed dispersers.



(Eckert & Ratnayke, 1994)

New Product: Bi-On CPB

- Formulation with a **reinforced activity** against **VOC's of large molecular weight** such as *limonene*.
- Recommended to protect citrus and pineapple transport.
- Planned assays:
  - Evaluation of ***Penicillium spore retention***
  - **Limonene** and **acetaldehyde** absorption capacity test.
  - Efficacy in **pineapple.**

Bi-On Trial in Citrus

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The **efficacy of Bi-On®** in citrus fruits has been shown in different **field as well as independent trials**.

Bi-On® reduces:

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

Bi-On Trial: Tangerines

Effect of Bi-On in the **Desinfection of Citrus Coldstores** were:

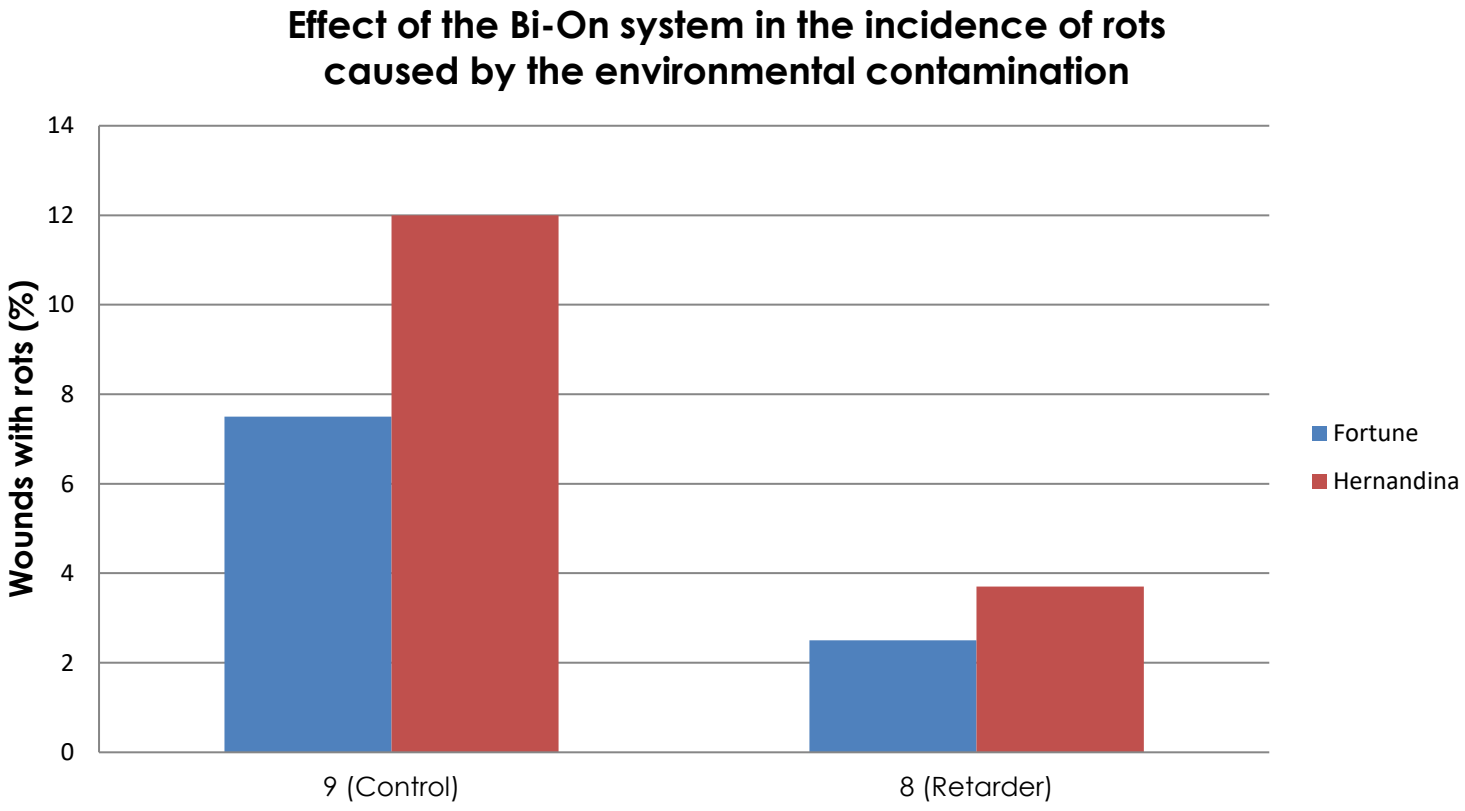
- *Fortune* and *Hernandina* **tangerines** (unwaxed, disinfected and artificially wounded) were kept for **2 weeks in cold stores at 3ºC** with and without Ethylclean system. The evaluation was performed after 7 days at 20ºC in aseptic conditions.

- Bi-On **reduced by 68%** the incidence of **decay** (*Penicillium digitatum + P italicum*) caused by the environmental pollution within the cold store.

(IRTA-Ebrefruit, 2010)

Bi-On Trial: Tangerines

Bi-On **reduced** the incidence of **rots** (**68%**) caused by the environmental contamination in cold store.



(IRTA(Spain), 2010)

Bi-On Trial: Oranges & Tangerines

Effect of Bi-On in the conservation of Citrus IATA (1997):

- Clementinas *de 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:
  - **Rotting** in the 3 fruits and specially in oranges.
  - **Rate of respiration i**n *Navelina* and *Clementina*.
  - **loss of acidity** in *Navelina*
  - **Weight loss** in *Valencia Late*

Bi-On Trial: Navelina Oranges

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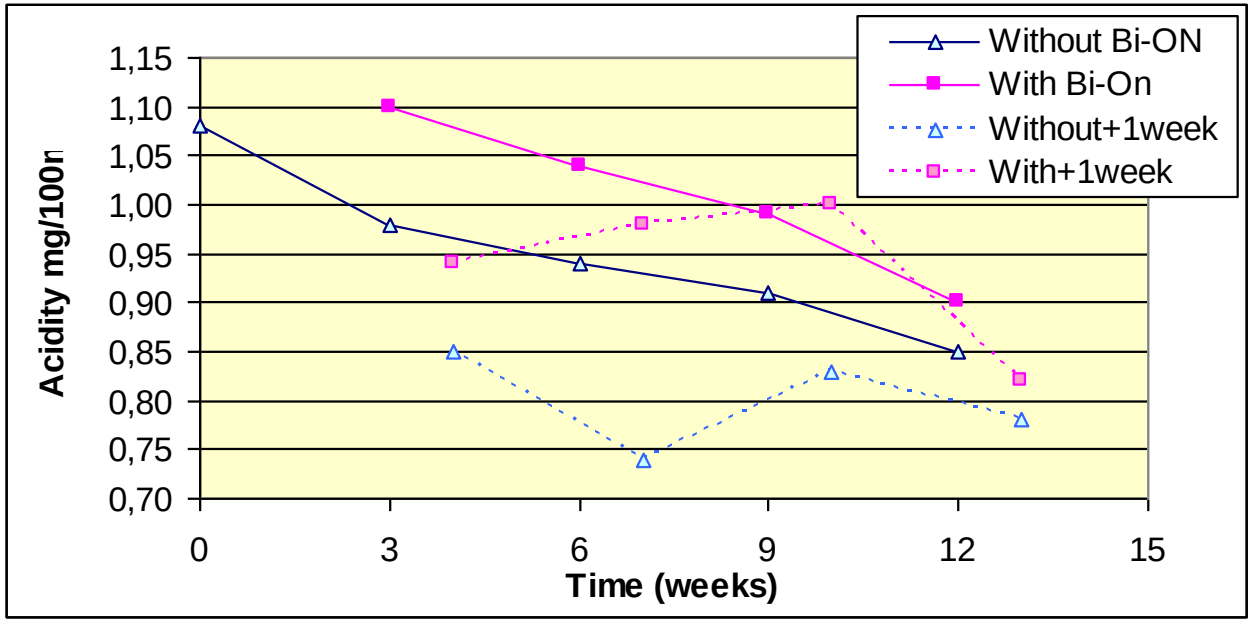
Bi-On **reduced fruit rottening and senescence**

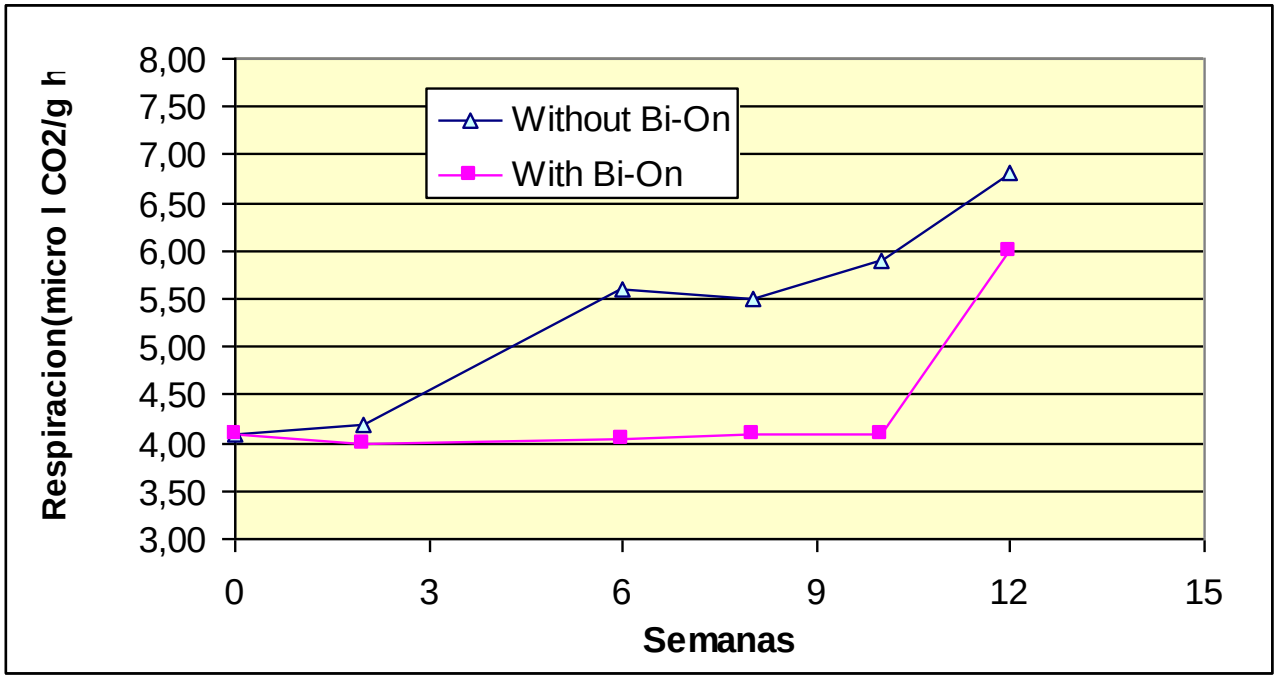


Navelina Oranges stored for 3,6,9 y 12 weeks at 2-3°C and kept at 20 days right after at 20°C.

[Ensayo realizado por I.A.T.A (España)]

Bi-On Trial: Clementines

Bi-On **reduced fruit rottening and respiration**.



Clementines stored dor 3,6,9 and 12 weeks at 2-3ºC and kept at 20ºC for 20 days right after.

[Assay carried out by I.A.T.A (Spain)]

Bi-On Trial: Valencia Late Oranges

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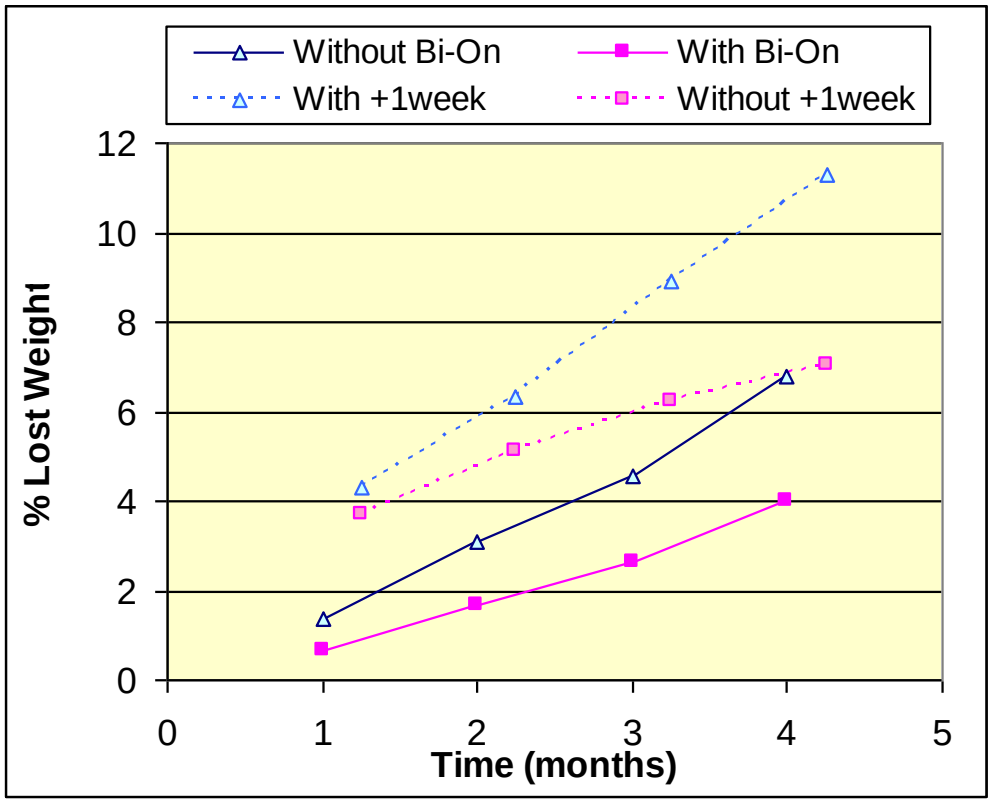
Bi-On **reduced fruit rottening and loss of weight**.



Valencia Late Oranges stored for 4, 8, 12 y 16 weeks
at 2-3°C and kept at 20°C for 20 days right after

[Assay carried out by I.A.T.A (Spain)]

Bi-On Trial: Limon

Bi-On **reduces senescence** and incidence of **fungal decay**.

Sotrage (days)	With Bi-On	Without Bi-On	Dacay Reduction
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 lemons. 4 ETH 1500 machines in the cold store; automatic ventilation system shut to keep the purified air inside.

[Assay carried out by CITRONAS(Holland)]

Bi-On Trial: Pineapple

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The efficacy of **Bi-On** in pineapple has been shown in different field trials and is backed up by commercial experience.

Bi-On **reduces**:

- **Rots** and **decay.**
- **Weight** losses.
- **Acidity.**
- **Softening.**
- **Yellowing.**
- **Chilling injury** (internal browning).

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Thank you

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