

POST  
HARVEST  
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extending  
shelf-life

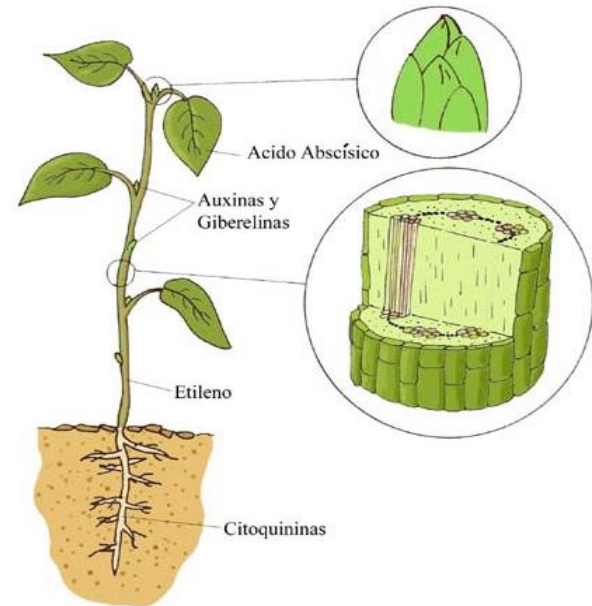
by **BON**

# BANANA



## What is ethylene?

- **Plant hormone** that regulates processes associated with **ripening and senescence**.
- **It accumulates** in storage chambers and transport containers.
- Physiologically active at **very low concentrations** (0.015 ppm).



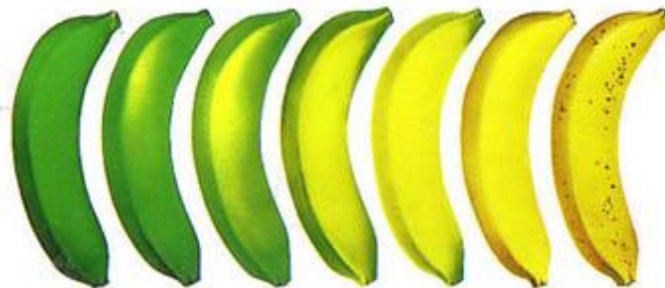
## Banana and ethylene

**Bananas** are a **climacteric fruit** (their respiration increases and they produce a lot of ethylene once harvested).

They are harvested at a **stage prior to ripening** for transport and are **artificially ripened** during transport in ethylene chambers (100-150 ppm, 15-20°C).

Banana quality will be seriously affected if bananas produce moderate amounts of ethylene **during transport**.

Measures should be taken to ensure that ripe green **bananas are not exposed to ethylene** until artificial ripening is required.



## Ethylene effects

- **Accelerates ripening** and over-ripening.
- **Softening** (loss of firmness).
- Alteration of color (**yellowing**).
- Increased incidence of **rots** and **microbial infections** (*Colletotrichum musae*, *Botrytis cinerea*, *Lasiodiplodia theobromae*).
- Increased probability of **losses during transport**.
- **Low lot homogeneity** after artificial ripening.



## Advantages of use

**Anthracnose**, caused by *Colletotrichum musae*, is a typical postharvest disease that is **evident on ripe banana**, especially in wounds and skin openings.

The ability of *Colletotrichum musae* to **produce ethylene** in vitro has been reported (Gunasekera et al, 2003). According to these authors, this ability to produce ethylene "may play a role in banana climacteric pathogenicity".

The **elimination of ethylene** during transport **delays the development of Anthracnose** after artificial ripening.



# Antracnosis and Ethylene

## Ethylene production by *Colletotrichum musae* in vitro

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### Abstract

Seven isolates of the pathogen *Colletotrichum musae* (Berk & Curt.) v. arx. were isolated from banana fruit. These isolates produced ethylene to varying degrees in methionine-amended Czapek Dox liquid medium as both shake and static cultures. Rates of ethylene production by *C. musae* were positively associated with the concentration of methionine in the growth medium. *C. musae* did not produce ethylene on basal medium containing L-glutamate,  $\alpha$ -ketoglutarate or L-cysteine. Isolate CM 100 produced the highest cumulative amount of ethylene ( $227 \mu\text{M g}^{-1}$  dry wt) over 12 days on 35 mM methionine-amended shake cultures of basal medium. In the presence of methionine, ethylene biosynthesis by *C. musae* occurred via 2-keto-4-methylthiobutyric acid (KMBA). The capacity of *C. musae* to produce ethylene may have a role in its pathogenicity on climacteric banana fruit.

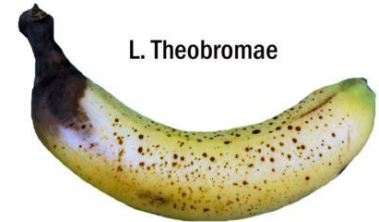
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## Crown rot and ethylene

**Crown rot**, caused among other fungi by *Lasiodiplodia theobromae*, is a typical postharvest disease **that becomes evident when bananas ripen**.

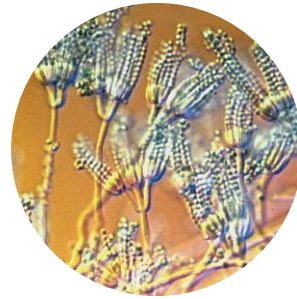
*Lasiodiplodia theobromae* requires **ethylene**-mediated activation of **skin-degrading** enzymes to invade the fruit (Brown & Burns, 1998).

The **elimination of ethylene** during transport **delays crown rot after artificial ripening**.



## Antimicrobial Action

- Potassium permanganate is a **potent disinfectant**.
- Fungi communicate by gas signals. **BION** eliminates many of these gases and **interrupts fungal growth**.
- The elimination of ethylene **prevents tissue softening**, which is necessary for fungal invasion.





## Benefits of use

- Increases the **shelf life** of the product.
- Reduces **waste** (over-ripening, rotting...).
- Maintains **batch homogeneity** after artificial ripening.
- Eliminates **odors** in cold storage.
- Avoids customer **complaints/returns/re negotiations.**
- Allows benefits from price **fluctuations.**
- **Harmless** to workers, product and environment.
- Maintains **color.**
- It is **disposable.**
- It is **easy** to handle and **inexpensive.**
- Improves product and company **image.**
- Can be used on **organic** products.



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