POST
HARVEST
_CARE

extending
shelf-life

by BION

Banana

BION

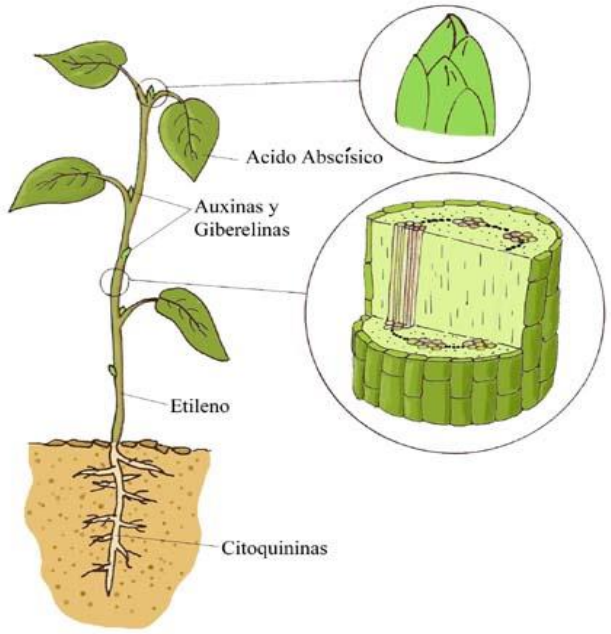
We improve air

What is the Ethylene?

Plant hormone that regulates the processes associated with **ripening and senescence.**

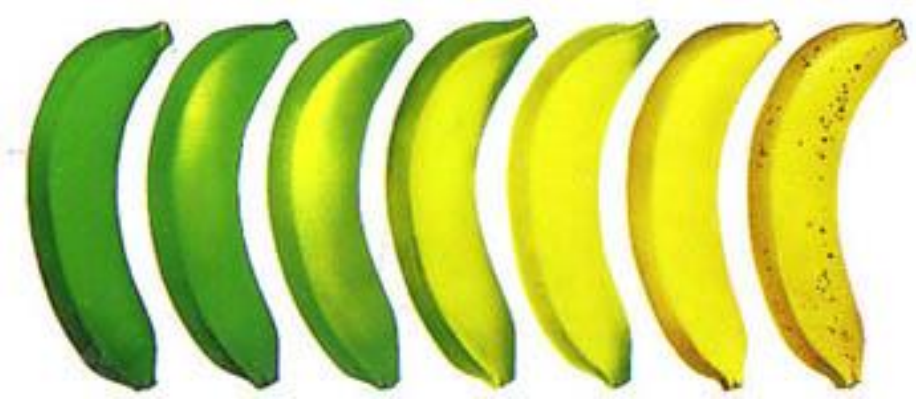
Its accumulate in storage chambers and transport containers.

Physiologically active very **low concentrations** (0,015 ppm)



Banana & Ethylene

The **banana** is a **climateric fruit** (experiences a peak in respiration and ethylene production during ripening – climaterium-).



It is harvested in **green – mature** stage (pre-climateric) for transport and it is **artificially ripen** at destination in ethylene chambers 100-150 ppm, 15-20ºC)

Banana quality will be severely compromised if bananans produce moderate amounts of ethylene **during transit**.

Action must be taken to ensure that mature hard green bananans are **not exposed to ethylene** until prompted during artificial ripening.

(Australian Banana Growers Council, 2001)

Effects of Ethylene

- **Accelerated** ripening and **over-ripening**.
- **Softening** (loss of hardness).
- Yellowing of hard green bananas.
- **Rottening** and **microbial infection** (*Colletotrichum musae*, *Botrytis cinerea*, *Lasiodiplodia theobromae*).
- More severe chilling **injury symptoms**.
- Increased probability of **suffering losses** during transport.
- **Lower batch homogeneity** after the artificial ripening.

Anthracnose & Ethylene

Anthracnose, caused by *Colletotrichum musae*, is a typical postharvest disease which **becomes evident in ripen banana**, specially in wounds and skin openings.

It has been reported the capacity of *Colletotrichum musae,* to **produce ethylene** in vitro (Gunasekera et al, 2003). According to this authors, this capacity to produce ethylene "may have a role in its pathogencicity on climateric banana fruit".

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

Source: http:/postharvest.ucdavis.edu/

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Anthracnose & Ethylene

Ethylene production by *Colletotrichum musae* in vitro

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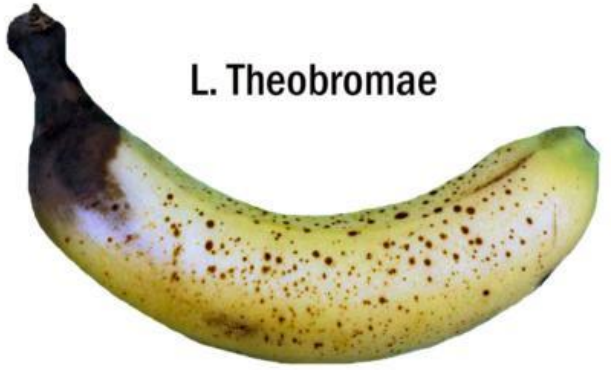
Abstract

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, α -ketoglutarate or L-cysteine. Isolate CM 100 produced the highest cumulative amount of ethylene (2·27 μM 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.

Ethylene & Crown Rot

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

Lasiodiplodia theobromae needs of the activation **via ethylene** of **skin degradation enzymes** to invade the fruit (Brown & Burns, 1998).

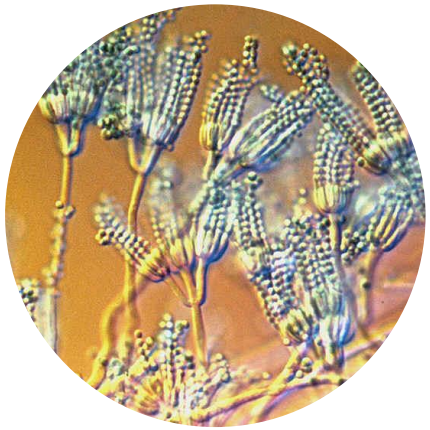


The ethylene removal during transport delays the development de crown rot after the artificial ripening.

Source: http:/postharvest.ucdavis.edu/

Anti-Microbial Action

- Potassium permanganates is a **powerful disinfectant**.
- Fungi communicate by gas signals. Bi-On removes many of those gases **interrupting fungal development**.
- Ethylene removal **prevents tissue softening**, which is necessary for fungal invasion.



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Bi-On: Benefits of use

- Increases **commercial life** of produce.
- Reduces **waste** (excess of ripening, rottening…).
- Keeps the **batch homogeneity** after artificial ripening.
- Removes **odours** in the cold chambers.
- Avoids **complaints/returns/renegotiations** from clients.
- Allows benefits from price **fluctuations.**
- Is **harmless** to workers, produce and environment.
- Keeps **colour.**
- Is **disposable.**
- Is **easy** to handle and **cheap.**
- Enhances product and company **image.**
- Is usable in **organic** products.

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