

POST
HARVEST
_CARE

extending
shelf-life

by **BION**



Squash

BION

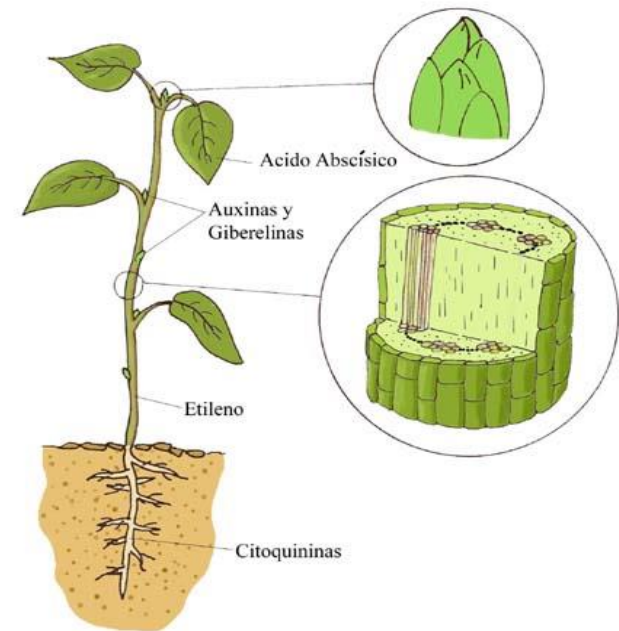
We improve air

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)



Squash

The word **squash** refers to several species within the genus **cucurbita**. They are roughly divided into **winter and summer squash**. Unlike summer squash, winter squash is harvested and eaten in the mature fruit stage, when the seeds within have matured fully and the skin has hardened into a tough rind (most varieties can be stored for use during the winter).

Squash is a **non climateric** fruit. It produces from low to moderate amounts of ethylene and it has a moderate sensitivity to ethylene.

WINTER SQUASH



Ethylene production **< 0.5 μ L C₂H₄/kg hr at 20°C**. If the fruit are chilled or wounded, the rates can be 3-5 times higher.

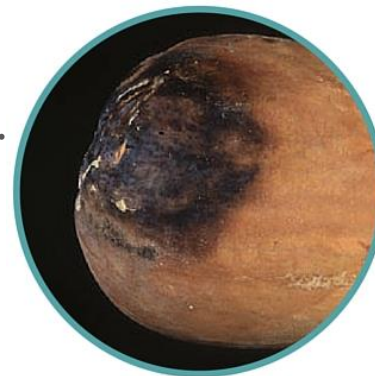
SUMMER SQUASH



Ethylene production **0.1-1.0 μ L C₂H₄/kg hr at 20°C**.

Effects of Ethylene in Squash

- Loss of green color (**yellowing**) in the green types.
- **Abscission of the stem** in winter squash (specially in less mature fruit).
- Ethylene exposure **aggravates the chilling injury symptoms** (sunken pits on the surface and high levels of decay once fruit are removed from storage).
- **Decay** and **fungal** rotting.
- Accelerated **aging** and **senescence**.
- Enhanced **respiration**.



Ethylene & Fungi

The ethylene exposure increases the risk of **fungal diseases**

The ethylene contamination **simulates microbial decay** because:

1. Ethylene simulates the **senescence** of the fruit. This process entails the skin deterioration which **makes possible the microbial infection.**
2. The **germination** of several **spores** of pathogenic fungi is **stimulated** in the presence of ethylene in the air.
3. The diseased fruit **produce more ethylene** which **affects the rest** of stored produce (turning them more sensitive to microbial attack)



Ethylene & Fungi

The **germination of the spore** and appresorium formation (organ for the invasion) of the pathogenic fungus *Colletotrichum gloesporioides* (which causes the disease known as **anthracnose**) is induced by an ethylene concentration in air ≤ 1 ppm.

Ethylene exposure induced the **appresorium development** of the spores of the pathogenic fungi *Alternaria alternata*, *Botrytis cinerea*, *Colletotrichum gloesporioides*, *Monilinia fruticola*, *Rhizopus stolonifer*, *Penicillium digitatum*, *Penicillium italicum* and *Thielaviopsis paradoxa* as well as the **spore** germination of the last three.



Ethylene & Non Climateric

Importance of low ethylene levels to delay senescence of non-climacteric fruit and vegetables

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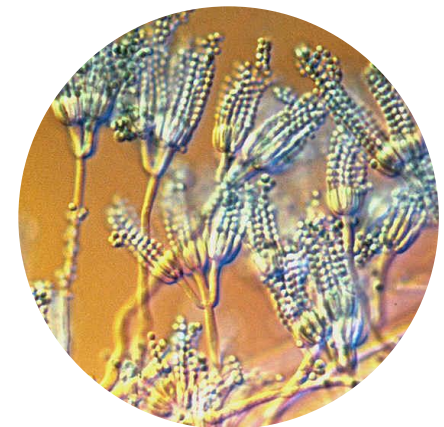
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Summary. The storage life of a range of non-climacteric fruit and vegetables was assessed during storage at ambient temperature (20°C) and low temperature (0–5°C) and ventilation with air containing ethylene over the range <0.005–10 µL/L. The storage life of Chinese cabbage and orange was found to be linearly extended with a logarithmic reduction in ethylene concentration. Across 23 kinds of produce, there was about a 60% extension in postharvest life when stored in <0.005 µL/L compared with 0.1 µL/L, the commonly considered threshold level for ethylene action. It is suggested that the threshold level of ethylene action on non-climacteric produce is well below 0.005 µL/L and that the level of ethylene that accumulates around produce in all commercial situations is always much greater than 0.005 µL/L. Hence, any postharvest action that reduces the accumulation of ethylene around non-climacteric produce during marketing will result in an increase in postharvest life.

Ethylene action threshold in non-climaterics **<0,005ppm**. Any action that reduces ethylene during marketing will result in an **increase in post-harvest life**.

Anti-Microbial Action

- Potassium permanganates is a **powerful disinfectant**.
- Clays **attract particles** on which many microbes tend to move in the air.
- 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.



Benefits of Use

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



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