

# Post-harvest Asparagus Handling



**Your produce much less perishable  
Su producto mucho menos perecedero**

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# Minimize Temperature Damage Immediately After Harvest

Pack in well ventilated crates, preferably light in color to reduce heat absorbance.



NEVER fill crates to more than  $\frac{3}{4}$  of their depth (to enable adequate ventilation).



Crates should not come into direct contact with the soil.

# Minimize Temperature Damage Immediately After Harvest



After harvesting, keep crates in the shade until transport to packing house.



Make frequent trips to the packing house.

# Upon arrival at the packing house

Upon arrival at packing house:

- Keep asparagus in the shade
- Immediately hose down to remove mud and dust
  - Be careful not to damage asparagus with high water pressure

Wash asparagus by placing crates in a bath containing

- Clean water
- pH 6.0-7.0 with 80 ppm free chlorine in the first bath if available. This is very important to avoid dehydrated asparagus draining water from this bath with contaminated water.
- pH 6.0-7.0 with 120 ppm free chlorine in the second bath



# Hydro-cooling

Hydro-cool asparagus to 10°C, in water at pH 6.0-7.0 with 120 ppm free chlorine by either shower or flume hydro-cooling.



# Waiting room

After hydro-cooling, asparagus should be placed in a waiting room at 10°C and 85-95% RH until it is processed



# Sorting and Bunching

After removal of asparagus from the waiting room, immediately sort and bunch.



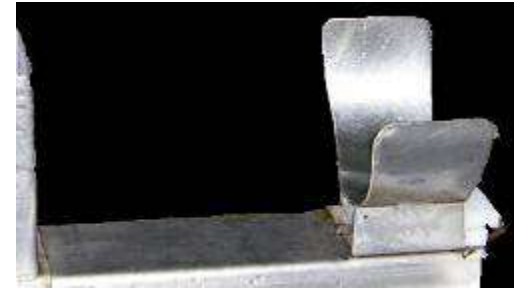
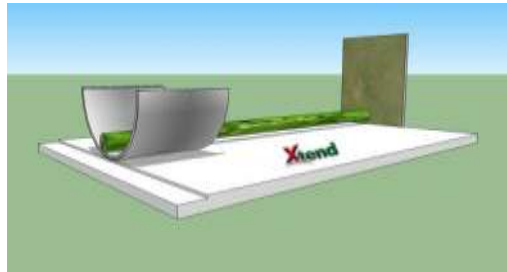
# Trimming

## Manual trimming

- Clean knives with disinfectant frequently to ensure that they are kept clean
- Sharpen knives regularly
- Place asparagus on a hard surface while cutting to obtain a smooth cut.

Recommended:

Hold bunched asparagus  
a semi-cylindrical device



# Second Hydro-cooling

## Second hydro-cooling

- To 1/2°C
- In water at pH 6.0-7.0 with 120 ppm free chlorine.
- Shower hydro-cooling is preferable.
- Choose a suitable height so that the water does not damage the tips of the asparagus.
- **Peracetic Acid 80/90 ppm** can also be used and had shown a good option for disinfection for white and green asparagus.



# Draining

- After second hydro-cooling, asparagus should be left to drain in cold storage at 1-2°C and 85-95% relative humidity.
- Do not drain for too long as it will dehydrate the produce.
- 



# Repacking



Repack in modified atmosphere bags at 1-2°C and 85-95% relative humidity.



# Xtend package types

Bulk and Industry bags



Retail bags and leading film



Roll stock film for flow pack



Bin bags for long storage



# Modified Atmosphere Packaging

- After sealing the bag, produce respiration lowers the O<sub>2</sub> concentration and results in a corresponding increase in the CO<sub>2</sub> concentration
- As the O<sub>2</sub> concentration decreases, produce respiration rate decreases until equilibrium is reached, at which the rate of O<sub>2</sub> uptake and CO<sub>2</sub> production of the produce equals the O<sub>2</sub> and CO<sub>2</sub> permeability of the bag

**10.0-15.0 % O<sub>2</sub>**  
**5.0-10.0 % CO<sub>2</sub>**



# Modified Atmosphere Packaging

High CO<sub>2</sub> and low O<sub>2</sub> concentrations in modified atmosphere packaging:

- Reduce respiration rate of asparagus, slowing aging and senescence
- Maintain nutritional value and flavor
- Reduce decay by directly inhibiting the growth of pathogens
- Block the mode of action of ethylene and thereby inhibit lignification

# Modified Atmosphere Packaging

Another important aspect of any packaging is the ability to eliminate excess moisture, since asparagus in particular is sensitive to moisture, which will aggravate:

- Flowering
- Discoloration
- Decay



# Modified Atmosphere Packaging

Modified atmosphere packaging for white asparagus

**Decreased O<sub>2</sub> inhibits browning**



# Modified Atmosphere Packaging

Modified atmosphere packaging for white asparagus

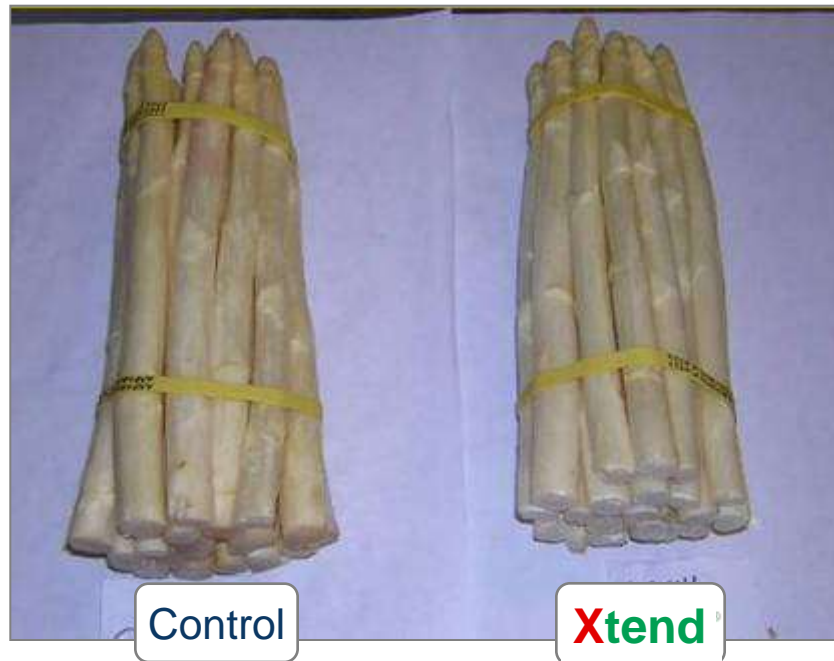
**... less shriveling and butt dryness**



# Modified Atmosphere Packaging

Modified atmosphere packaging for white asparagus

**... Reduced lignification**



# Modified Atmosphere Packaging

## Modified atmosphere packaging for green asparagus

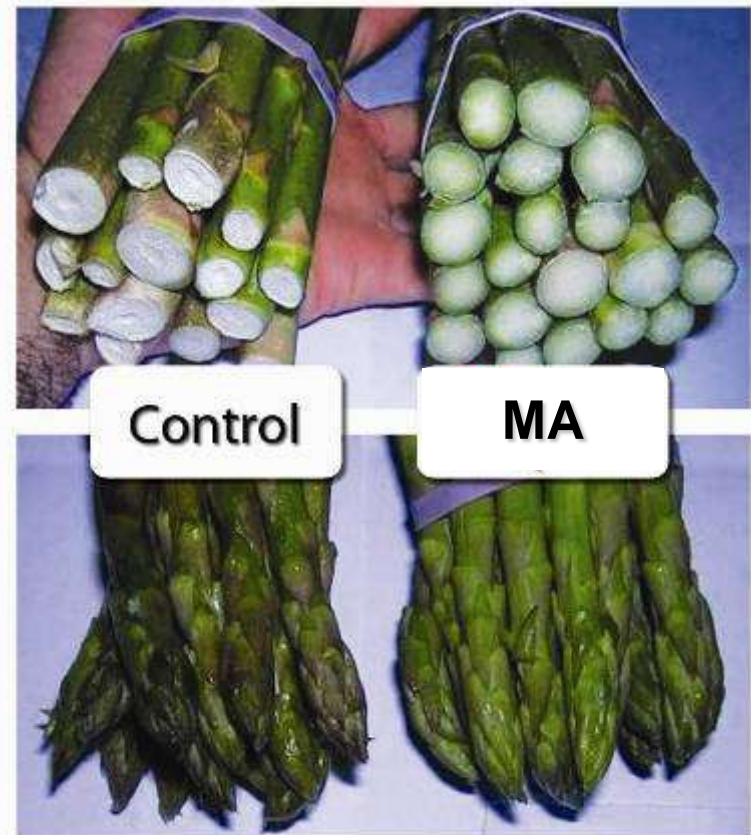
- Preserves firmness and taste
- Minimizes feathering
- Retains green, glossy tips
- Prevents decay
- Reduces shriveling, spear toughening and butt drying



# Modified Atmosphere Packaging

## Modified atmosphere

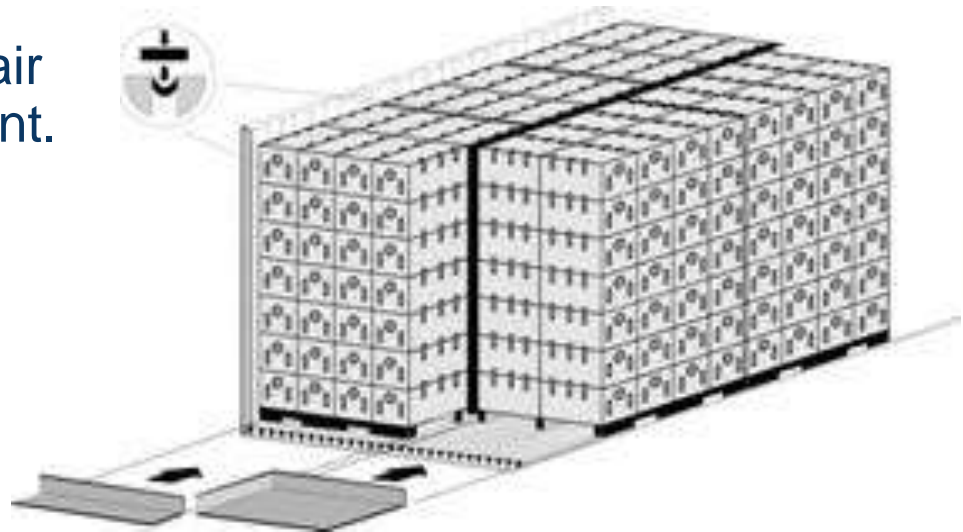
A noticeable difference



Green asparagus stored 24 days at 1-2°C

# Optimizing Air Distribution

- Maintain uniform air temperature throughout the container/trailer.
- Optimize utilization of the cold air supply from the container refrigeration unit.
- Inhibit the bypass of cold air directly to the return air vent.



# Temperature Monitoring

To ensure asparagus remains fresh during transit monitor temperature with data loggers or



**A real time, web-based, supply chain management program**

