

# Special Research Report #412: Postproduction

## Preventing Ethylene Injury to Fresh Cut Flowers

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### BACKGROUND

Ethylene is the “silent killer” to fresh cut flowers. It is a natural plant hormone that regulates many plant functions, e.g., fruit ripening and plant senescence.

However, when plants are exposed to external ethylene from sources; e.g., truck exhaust; heaters; cigarette smoke; and ripening fruit; flowers, buds, and leaves of cut flowers can be adversely affected. Buds and flowers can turn yellow, wilt, and/or drop. Buds may fail to open and flowers die prematurely.

Not all cut flowers are sensitive to ethylene, but many like carnations, snapdragons, lilies, and baby’s-breath are very sensitive (See Table 1).

Ethylene can shorten the life of flowers and have a direct impact on customer satisfaction and sales.

### SOURCES OF ETHYLENE

Ethylene is odorless and colorless, making it impossible for the human senses to detect. Flowers are likely to get exposed to ethylene during the transportation and processing of flowers. The exhaust from trucks and forklifts are major sources of contamination.

Dead and decaying plants that are in coolers or in flower processing areas, cigarette smoke and ripening fruit are also sources that can generate ethylene. Placing sensitive flowers in the fruit and vegetable section of grocery stores is the worst location for flowers to be displayed. This is due to the generation of ethylene from ripening fruit.

Ethylene is also produced internally in flowers, especially when under stress conditions. Stresses that can trigger ethylene include: temperatures that are too high or too low, vibration during transport, wilting and aging. Stress induced internal ethylene will also shorten the life of flowers. Thus, they need to be handled with care!

### SENSITIVE FLOWERS

Flowers can respond to ethylene concentrations in the air as low as 100 parts in one billion parts of air (100 ppb). Many flowers are sensitive to ethylene (Table 1).

Table 1. Common flowers that are sensitive to ethylene.

<b>Alstroemeria</b>	Asiatic Lily
Anemone	Oriental Lily
Gypsophila	Lisianthus
Bouvardia	Rose (some)
Carnation	Snapdragons
Daffodil	Statice
Delphinium	Stock
Freesia	Waxflower

### PROTECTING FLOWERS

There are three ways to protect plants from ethylene injury. It can be prevented by avoiding external ethylene exposure, providing proper care to avoid plant stresses, and by pre-treating flowers with anti-ethylene compounds.

Keep idling vehicles away so the exhaust does not drift into storage or display areas. Remove old, decaying flowers from storage areas, and keep coolers and work areas free from plant debris. Employees should never

smoke or store fruits near flowers. These easy, simple steps are ways florist can take control in preventing ethylene damage on flowers.

Treating flowers with anti-ethylene compounds will protect flowers from ethylene injury. Flowers can be treated at harvest and/or throughout the distribution chain. However, flowers treated at harvest, provide maximum protection before they go into the distribution channels where chances of ethylene exposure are high.

Research has shown that commercially available chemicals such as EthylBloc (1-MCP) and silverthiosulfate-based materials like Chrysal AVB are very effective in preventing ethylene damage on many sensitive cut flower species (See Photo 1).

Photo 1. Chrysal AVB protects Delphinium from ethylene injury.



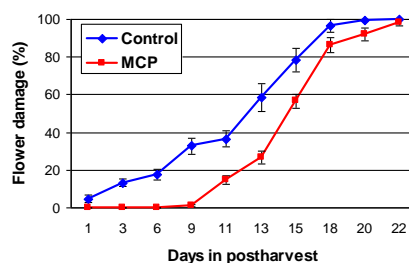
Non-treated AVB

Chrysal AVB is mixed with water and flower stems are placed in the solution

immediately after cutting for a minimum of 4 hours.

EthylBloc is administered in gas form. Thus, the flowers must be in a fully sealed area. Treatment times vary depending on temperature, but average anywhere from 4 to 24 hours. Besides treating at the grower level, many companies are treating flowers on trucks during transport with EthylBloc.

Fig. 1. Snapdragons treated with MCP are protected from ethylene injury.



Treating with EthylBloc more than once in the distribution chain is not harmful. It is especially beneficial when there are multiple flowers per stem and they are at different stages of development.

Our research has shown that these anti-ethylene compounds lose efficiency over time, and that depending on crop, flowers can be protected from ethylene for a week to 10 days after treatment.

## CONCLUSIONS

Ethylene is a major cause of premature senescence of many fresh cut flowers. Wilted petals, dropped buds and yellowing leaves are signs of ethylene injury.

Follow the guidelines below to avoid ethylene injury:

- \* Protect plants from ethylene sources
- \* Keep areas clean of dead/decaying plants
- \* Provide proper care to avoid plant stresses
- \* Buy flowers treated with anti-ethylene compounds

## IMPACT TO THE INDUSTRY

Keeping flowers safe from ethylene takes time and effort. However, it is worth the investment to ensure that consumers get a quality product that will not die prematurely. Proper treatment and care of flowers to avoid and protect from ethylene exposure is one of the most important factors for all segments of the industry. Protection allows the industry to maintain quality products.

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