

# Postproduction Care and Handling: How do we maintain plant quality after production?

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## **Postproduction quality**

Most people have heard of the term postharvest quality, which usually refers to the vase life of cut flowers. People that retail cut flowers have been told that the care and handling of cut flowers after harvest (i.e. postharvest) will directly influence the vase life and the quality of a bouquet of flowers. The factors that affect postharvest quality are temperature, water and ethylene gas. What many people don't realize is that these same factors can influence the quality and subsequent sale ability of bedding plants, flowering potted plants and foliage plants. The goal during production is to produce a high quality plant as efficiently as possible. As an industry, you know how to grow quality plants. The goal during the postproduction phase of a plants life, from shipping to retailing, must therefore be to maintain plant quality and insure that the customer receives the best quality plant.

Postproduction losses of floriculture crops have been conservatively estimated at 20%. This is a staggering sum when you consider that the wholesale value of floriculture crops in 2003 was estimated at \$5.07 billion. Decreasing postproduction losses can put dollars back into the pockets of floriculture professionals at all stages of the production and marketing chain.

## **Senescence**

Decreased plant quality and sale ability following production are generally the result of plant senescence. Senescence represents the last stage of plant development and often results in the death of whole plants or plant organs including leaves or flowers. While senescence is a natural part of plant development, environmental stresses during shipping, in retail environments, and in the home and garden can accelerate senescence. These stresses include less than optimal watering and exposure to high temperatures and ethylene gas. Symptoms of senescence that reduce the quality of floriculture crops include leaf yellowing, flower wilting, abscission of flowers and flower parts, fading of blossoms, and death.

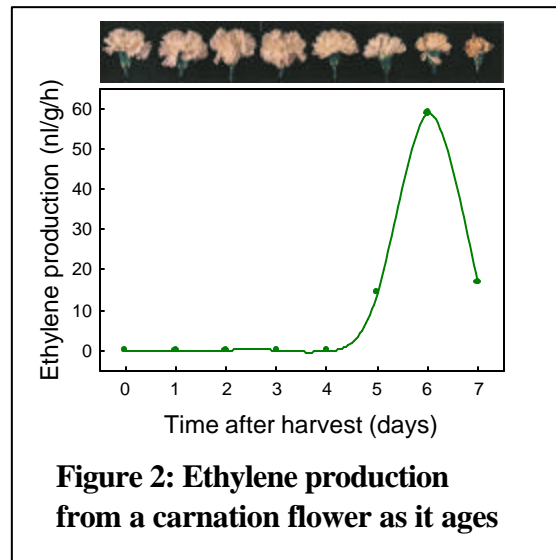


**Figure 1: flower senescence**

## Ethylene

Ethylene is a gas that is produced by all plants. Many plants are sensitive to ethylene and respond with accelerated senescence. Ethylene is produced during normal plant growth and development. One stage of growth where ethylene is most prevalent is during the aging and death (senescence) of plant tissues. For example, young, newly opened flowers like those on the left side of the picture in figure 2 do not produce much ethylene. As the flower gets older, it starts to produce ethylene. It is this ethylene that causes the death of the flower. Since ethylene is a gas, the ethylene produced by one dying flower can affect neighboring plants, especially if plants are sealed in a truck or shipping box. The extent of ethylene damage depends on how sensitive the plant is to ethylene, the amount of ethylene it is exposed to, and how long it is exposed. Some plant species like geranium, petunia, carnation, orchids, snapdragons, and fuchsia are very sensitive to ethylene. Other plants, including anthurium, gerbera, tulip, chrysanthemum, African violets, and cyclamen are relatively insensitive to ethylene. Seedlings and plugs

are more sensitive to ethylene than more mature plants, and flowers and fruits are generally more sensitive to ethylene than leaves. Dead and decaying plant material and the bacteria involved in this decomposition also give off ethylene. This is one of the reasons it is vital to make sure that dead leaves and flowers are removed from plants before they are shipped. Wounding plants also causes them to produce ethylene, therefore packaging and handling that minimizes mechanical damage will extend the life of the plant.



## Temperature and Water stress

Less than optimum temperatures and watering during shipping or in the retail environment can also have a negative impact on plant quality by accelerating senescence. During production, when all growing conditions are ideal, photosynthesis is optimized and plants are able to produce and store carbohydrate reserves (i.e. their food). The shelf life of these plants is highly dependent on these reserves. In many retail environments photosynthesis is reduced because light levels are not ideal. If temperatures are too high, plants also have high rates of respiration. Respiration is the process that plants use to break down their food reserves and release the energy they need to grow. When they use up all these reserves the plants will die. High temperatures also cause plants to produce more ethylene, which accelerates senescence. Proper watering is also essential for plant growth. Both drought stress and over watering are stresses that cause the leaves of a plant to produce more ethylene and lead to the accelerated death of the plant.

**It all comes back to ethylene**

While some plants are not sensitive to ethylene, many of the plants grown for ornamental purposes are. While most people realize the importance of proper watering and temperature control during the postproduction handling of plants, they do not understand the interaction between these stresses and ethylene. If a plant is sensitive to ethylene, any stress that causes that plant to produce more ethylene will dramatically shorten the lifespan of the plant. The best way to enhance the quality of plants following production is therefore to avoid damage and stresses that cause plants to produce ethylene and to remove sources of ethylene like dead leaves and flowers. Plants can also be treated with chemicals like EthylBloc® that make them less sensitive to ethylene.