



## Preventing ethylene damage

by Allen Langton, HRI Wellesbourne

Ethylene, either generated naturally within the plant or as a gaseous pollutant, accelerates post-harvest senescence in many ethylene-sensitive pot plant and cut flower species. Failure to prevent ethylene damage can seriously reduce product quality and post-harvest longevity.

### Symptoms of ethylene damage

- Premature in-rolling and wilting of the flower petals (as in carnation and kalenchoe), possibly followed later by flower drop.
- Premature petal drop 'shatter' or flower drop (as in geranium or hibiscus).
- Premature leaf yellowing and / or leaf drop (as in philodendron or schefflera).

These are all normal consequences of aging - but ethylene advances the onset of these events in ethylene-sensitive species.

### Avoiding ethylene as a gaseous pollutant

- Do not transport, store or display ethylene-sensitive species together with ethylene-producing commodities such as ripening fruit.
- Do not expose ethylene-sensitive species to vehicle exhaust fumes.
- Ventilate plant handling areas with fresh air, ensuring at least one air exchange per hour.
- Use cool temperature storage, transport and display (12°C is suitable for many species, but is too low for others, including many foliage plants and poinsettia).
- Consider monitoring the ethylene levels in packing and storage areas using gas sampling indicator tubes, and using ethylene scrubbing to remove ethylene.

These steps will prevent damage from ethylene in the environment, but will not protect against ethylene produced within the plant.

### Protecting plants against ethylene

- Pulse treatments with silver thiosulphate (STS) formulations ('Argylene' from Fargro has PSD approval for use in the UK) protect ethylene-sensitive cut flowers against ethylene as a pollutant and also against ethylene produced within the plant - and markedly extends post-harvest life. Its use is compulsory on 13 cut-flower species delivered to the Dutch auctions. Follow label recommendations and regulations regarding the disposal of spent product. STS will not extend post-harvest life of insensitive species such as chrysanthemum.
- STS is also recommended by suppliers as a spray to protect ethylene-sensitive pot plants (except in Holland where spray application of STS is banned on environmental grounds). However, sprays can cause petal spotting and application needs to be done 8 - 14 days before marketing when most flowers are still immature. Test first on a small scale to work out effective procedures.
- Chrysal EVB contains no silver and is more environmentally friendly than STS though it is not registered for use in the UK. This non-silver product only reduces internal ethylene production and does not protect (or only slightly protects) against ethylene as a gaseous pollutant.
- 1-MCP is expected to be marketed in the USA this year. It should be an environmentally friendly, direct alternative to STS, protecting against both internal and external ethylene. It will be marketed as a powder to which water is added to generate 1-MCP as a gas. It has the potential to be very useful for pot plant growers but will probably require PSD registration.

The full review cites about 130 references on ethylene action and avoidance. An appendix expands on responses of particular species and of the usefulness (or otherwise) of anti-ethylene agents to protect them against ethylene

## Sensitivity of various crops to ethylene

More extensive species lists can be found in the full report.

Species	Sensitivity	Symptoms
achimenes	+++	petal / flower drop
alstroemeria	++	flower wilt / drop
anthurium	—	—
antirrhinum	+++	flower drop
azalea	++	leaf yellowing / drop
begonia	+++	buds fail to open; flower drop
calceolaria	++	flower drop
campanula	+++	buds fail to open; petal / flower drop; leaf wilt
carnation	++++	flower wilt
Christmas cactus	++++	flower drop
chrysanthemum	—	— (but fungal infection can be increased)
cineraria	—	—
codiaeum	—	—
cordyline	—	—
cyclamen	+	flower wilt / drop
cyclamen pollinated	+++	flower wilt / drop
cymbidium orchid	++++	flower coloration / wilt
daffodil	+	flower wilt
dahlia	+	flower wilt
delphinium	++++	flower drop
dieffenbachia	+	leaf yellowing
dracaena	+	leaf yellowing / drop
figus	+	leaf drop
freesia	+	flower wilt
fuchsia	++++	petal / flower / leaf drop
geranium	+++	petal drop; leaf yellowing
gerbera	+	flower wilt
gloxinia	+	petal / flower drop
gypsophila	++++	flower wilt
hibiscus	++++	flower / leaf drop
impatiens (New Guinea)	++++	flower drop
kalanchoe	+++	buds fail to open; flower wilt
lily	+	flower wilt
lisianthus (eustoma)	+++?	flower wilt?
nephrolepis	—	—
philodendron	++	leaf yellowing / drop
poinsettia	+	leaf wilt; leaf / bract / cyathia drop
primula (acaulis hybrids)	—	—
regal pelargonium	+++	petal drop
rose	+ to +++	buds fail to open; leaf yellowing; bud / leaf drop
saintpaulia	++	flower wilt
schefflera	++	leaf drop
solanum (Xmas cherry)	+++	leaf drop; fruit ripening / drop
stock	++	flower wilt
streptocarpus	+++	flower drop

### Sensitivity groupings:

— insensitive; + slightly sensitive; ++ moderately sensitive; +++ highly sensitive; ++++ very highly sensitive.