

# Chemical compounds interacting with the ethylene receptor in ornamental crops

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## Abstract

Ethylene is known to cause many undesirable effects in a range of ornamental plants. Blocking ethylene responses is an efficient strategy to enhance the longevity of flowers and display life of potted plants that are ethylene sensitive. One of the most effective and inexpensive ways to conduct such interference is through the use of chemical compounds. Since the early 1970s silver thiosulfate (STS) has been widely used as a powerful ethylene antagonist, but in the last two decades a large number of volatile chemical compounds have been evaluated for their effect on ethylene production and perception. This has resulted in the discovery that cyclopropenes effectively block ethylene responses at the receptor level. The most effective among these are 1-methylcyclopropene (1-MCP) and a number of other substituted cyclopropenes. 1-MCP has been successfully commercialized and is presently worldwide used for ethylene sensitive horticulture crops. Because of the volatile character of most cyclopropenes, treatment of plant material is limited to enclosed systems. For outdoor applications, non-volatile formulations are desired. In recent years several newly synthesized non-volatile cyclopropenes with a methyl group in the 1-position, on which a substituted amine was attached, have been reported. When diluted with a weak acid such as acetic, formic, carbonic or phosphoric, a non-volatile salt is formed which can be applied as a liquid solution. N,N-dipropyl(1-cyclopropenyl-methyl)amine (DPCA) applied to plant material as a gas, dip or spray has been shown as an effective ethylene blocker in several plant species. Another novel water soluble, non-phytotoxic, and odorless inhibitor of ethylene action, 3-cyclopropyl-1-enyl-propanoic acid sodium salt (CPAS), has been tested on carnation and petunia, and on several edible products. All tested plant material was effectively protected against undesirable effects of ethylene. A lot of testing remains to be done

to uncover the full potential of these compounds, but they do offer promising new ways to improve the postharvest quality and longevity of ornamentals.