



By Erik Runkle  
and  
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# Avoiding Ethylene Problems

Recognizing ethylene symptoms and knowing how to test for them will help minimize greenhouse production problems.

**E**thylene is a natural plant hormone that can cause a number of undesirable responses for greenhouse crops including leaf yellowing and curling, excessive branching and, most commonly, flower drop and flower bud abortion (see sidebar, below). Ethylene is active at extremely low levels in the air. Many plants begin to respond to ethylene at a concentration of approximately .05-.1 ppm, but some crops may be more or less sensitive.

Anyone who has applied Florel (ethephon) knows about some of the plant responses to ethylene. Usually, the most obvious response is flower petal drop, although some plants (such as New Guinea impatiens) exhibit excessive branching and delayed flowering. In the presence of low levels of ethylene, flowers can develop abnormally, flowers can open incompletely or flower longevity can be short. Although Florel is commonly applied at 300-500 ppm, the concentration of ethylene in the plant tissues from the application is much less. Plant responses to ethylene are commonly observed at levels less than 1 ppm and are more pronounced when plants are exposed to ethylene over an extended period of time.

## Finding The Source

The most common sources of ethylene gas are incomplete combustion of organic fuels (usually from low oxygen) and insufficient exhausting of greenhouse heaters. When there is an inadequate intake of fresh air (from outside the greenhouse), incomplete oxidation of propane and natural gas can form ethylene and other hydrocarbons. Problems with ethylene are greatest in winter when greenhouse air exchange is at its lowest and heat demand is greatest.

Heaters should be cleaned and inspected before starting them for the season. Cleaning heaters will increase efficiency and improve the ability to identify cracks. A crack in the combustion chamber or heat exchanger allows ethylene and other undesirable gases to enter the greenhouse. Repairing or replacing cracked heaters before they are used in the fall will go a long way in preventing ethylene problems.

## Testing For Ethylene

Recommended times to check greenhouses for ethylene contamination are after new heaters have been installed, when

heaters are used for the first time each year and when symptoms that look like ethylene damage are found in a heated greenhouse. To collect an air sample to test for the presence of ethylene, you will need glass syringes (5-10 mL), rubber septa to seal the open end of the syringe, a solid box for shipping and adequate packing material to prevent syringes from breaking or becoming loose.

To test for ethylene, a sample should be collected by filling a 5- to 10-mL glass syringe three-fourths full of air from the desired location. If only a couple of heaters are present, it is best to take samples from the heated air stream as it leaves a heater's heat exchanger before a significant amount of the heated air has mixed with the colder greenhouse air. Glass syringes work best because plastic syringes can absorb some gaseous compounds. The open end of the syringe must then be sealed with a rubber septum. I recommend red rubber sleeve stoppers for serum vials (size no. 7); these are available from scientific supply houses. Be sure the syringes are relatively new and form an airtight seal.

The syringes should be labeled with letters or numbers using permanent ink on the barrel of each syringe. These sample locations of the corresponding letters or numbers should remain with the greenhouse so the analysis lab is unaware of their contents. You might also want to include a sample from a greenhouse in which ethylene is not suspected, which can act as a control.

To prevent movement of the plunger or loss of the septum during transit, it is a good idea to secure them with adhesive tape. Syringes should be shipped in a sturdy box and packed so they do not touch one another. Plastic bubble wrap works well to separate the syringes and prevent motion during shipping. Shipping time should not exceed two days.

The samples should then be sent to a university or a diagnostic lab that can measure low levels of ethylene. The analysis lab should return a tabulated analysis sheet within a day or two of receipt. For assistance with interpretation of the analysis sheet, contact an extension educator or your state land-grant university. If ethylene is contaminating your greenhouse, be sure to identify and fix the problem as soon as possible before ethylene damage occurs. **GPN**

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## Effects Of Ethylene On Greenhouse Crops

- Induces leaf epinasty (leaf twisting)
- Promotes abscission of flower buds, flowers and leaves
- Inhibits stem extension
- Promotes axillary branching
- Stimulates chlorophyll loss
- Promotes flowering in bromeliads