

EthylBloc™ minimizes damage to foliage plants exposed to environmental or internal ethylene, protecting ethylene-sensitive foliage plants from damage, including leaf drop, yellowing and browning.

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Introduction

People working at home during the pandemic rediscovered the benefits of adding foliage plants to enhance their work environments. Sales of these long-lasting plants surged dramatically during 2020 and 2021. During this period, and in the past, suppliers had noticed some problems with leaf drop and leaf edge burn — symptoms that are associated with drying out, exposure to temperature extremes and, importantly, ethylene damage.

Most U.S. foliage plants are grown in the warm climates of Florida, Texas and California and shipped throughout the U.S. for sale at garden centers, big box stores and supermarkets. Plants may be exposed to long periods of darkness, temperature extremes and vibration during transport and storage, some of which may trigger internal ethylene production in the plants. Storage in supermarket distribution centers may also expose plants to high ethylene concentrations from motor exhaust and/or ripening produce.

Although long recognized for its damaging effect on flowers, ethylene has not been considered a serious problem on foliage plants. But some plants are particularly sensitive and require treatment to prevent damage. Research at the University of Florida evaluated the ethylene sensitivity of 20 popular foliage plants and demonstrated the value of EthylBloc™ 1-MCP technology (active ingredient 1-methylcyclopropene) treatment to prevent symptoms of ethylene damage.

Materials & Methods

Twenty foliage plants (Table 1) were tested for ethylene sensitivity. Plants were obtained from commercial growers and exposed to four levels of ethylene (0.0, 0.1, 1.0 and 10.0 ppm) for four days at 70°F (21°C) in the dark. After completion of the treatments, plants were maintained at 70°F (21°C), 50% +/- 10% humidity and 75 foot-candles of light for 12 hours daily. We documented plant and leaf quality every 2 days.

In subsequent trials, we treated plants shown to be ethylene-sensitive with EthylBloc™ and then exposed them to ethylene as described above. A control group of plants were not treated with EthylBloc™ but were exposed to ethylene. Plants were evaluated for plant and leaf quality every 2 days.

Results

The symptoms of ethylene damage varied widely in the foliage plants tested, including leaf yellowing, leaf drop and marginal leaf necrosis (Table 1).

Ethylene reduced the display life of 16 of the 20 potted foliage plants by causing leaf drop or leaf yellowing. Seven plants had leaf drop, while leaf yellowing and/or browning (Table 1) occurred on nine other sensitive genotypes (Figure 1) (*Aglaonema* 'Mary Ann', *Anthurium scherzerianum* 'Red Hot', *Anthurium scherzerianum* 'White Gemini', *Chlorophytum comosum* 'Hawaiian', *Dieffenbachia maculata* 'Carina', *Dracaena marginata* 'Bicolor' and 'Magenta', *Euphorbia splendens* 'Short and Sweet', *Spathiphyllum* 'Ty's Pride').

Ethylene exposure also accelerated senescence (i.e., browning) of the spadix and the surrounding spathe on *Anthurium scherzerianum* 'Red Hot' and 'White Gemini'. There was no evidence of leaf epinasty on any of the genotypes after exposure to ethylene. The four genotypes that remained insensitive to ethylene were *Asplenium nidus*, *Chamaedorea elegans* 'Neathe Bella', *Hedera helix* 'Chicago', and *Syngonium podophyllum* 'White Butterfly'.

EthylBloc™ minimizes damage to foliage plants exposed to ethylene, whether environmental or internal. We treated plants with EthylBloc™ before exposing the plants to ethylene or to fresh air with no ethylene. EthylBloc™ treatments were successful in protecting ethylene-sensitive foliage plants from damage, including leaf drop and yellowing (Figures 1 and 3).

Treating the three most sensitive foliage plants (*Aglaonema* 'Mary Ann', *Polyscias fruticosa* 'Castor', and *Schefflera arboricola* 'Gold Capella') with EthylBloc™ for 4 hours at 70°F (21°C) lowered leaf drop to near zero. All other plants showed no ethylene symptoms following EthylBloc™ pre-treatments.

Some foliage plants are damaged by exposure to ethylene. Seventy-five percent of the plants tested showed some degree of ethylene sensitivity. The same symptoms can be caused by drying out and exposure to temperature extremes, but it is important not to overlook ethylene exposure as another possible cause. Our results suggest that treatment with EthylBloc™ is a valuable tool for maximizing marketability of foliage plants.

Acknowledgements

The assistance of Andrew Macnish and Ria Leonard is greatly appreciated. The support of the National Foliage Foundation (now the National Horticulture Foundation) helped to support this project.

Table 1. Symptoms of Ethylene Damage on Popular Foliage Plants

Common Name	Scientific Name and Variety	Ethylene Injury Symptoms
Arrowhead Plant	<i>Syngonium podophyllum</i>	Not Sensitive
Bird's Nest Fern	<i>Asplenium nidus</i>	Not Sensitive
China Doll	<i>Radermachera sinica</i> 'China Doll'	Leaf Drop
Chinese Evergreen	<i>Aglaonema</i> 'Mary Ann'	Leaf Yellowing
Croton	<i>Codiaeum variegatum pictum</i> 'Petra'	Leaf Drop
Crown-of-Thorns	<i>Euphorbia splendens</i> 'Short and Sweet'	Leaf Yellowing
Dragon Tree	<i>Dracaena marginata</i> 'Bicolor'	Leaf Yellowing
Dragon Tree	<i>Dracaena marginata</i> 'Magenta'	Leaf Yellowing
Dumb Cane	<i>Dieffenbachia maculata</i> 'Carina'	Leaf Yellowing
Dwarf Schefflera	<i>Schefflera arboricola</i> 'Gold Capella'	Leaf Drop
English Ivy	<i>Hedera helix</i> 'Chicago'	Not Sensitive
False Aralia	<i>Schefflera elegantissima</i> 'Gemini'	Leaf Drop
Flamingo Flower	<i>Anthurium scherzerianum</i> 'White Gemini'	Leaf Yellowing, early spadix browning
Flamingo Flower	<i>Anthurium scherzerianum</i> 'Red Hot'	Leaf Yellowing, early spadix browning
Ming Aralia	<i>Polyscias fruticosa</i> 'Castor'	Leaf Drop
Neanthe Bella Palm, Parlor Palm	<i>Chamaedorea elegans</i> 'Neathe Bella'	Not Sensitive
Peace Lily	<i>Spathiphyllum</i> 'Ty's Pride'	Leaf Yellowing
Spider Plant	<i>Chlorophytum comosum</i> 'Hawaiian'	Leaf Yellowing
Weeping Fig	<i>Ficus benjamina</i>	Leaf Drop
Zebra Plant	<i>Aphelandra squarrosa</i> 'Dania'	Leaf Drop

Fig. 1 Leaf browning on *Aglaonema* following ethylene exposure, showing *Aglaonema* is ethylene sensitive and would benefit from EthylBloc™ treatment. Plant on the left was exposed to ethylene. Plant on the right was exposed to air.



Fig. 2 Left, *Aphelandra* plant with no EthylBloc™ treatment. Center plant, treated with EthylBloc™ as a one-time treatment (0.9 µL/L- for 5 hours at 21°C). Right, plant treated with an EthylBloc™ Sachet in the shipping box for 3 days at 14°C. All plants were exposed to ethylene at 1 µL/L-for 4 days at 21°C following the three treatments.



Fig. 3 Left, *Schefflera arboricola* plant with no EthylBloc™ treatment. Center, plant treated with EthylBloc™ as a one-time treatment (0.9 µL/L- for 5 hours at 21°C). Right, plant treated using an EthylBloc™ Sachet in a shipping box for 3 days at 14°C. All plants were treated with ethylene at 1 µL/L-for 4 days at 21°C following the three treatments.



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