FloraLife®

Research Update

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EthylBloc™ Technology

Different Temperatures with Potted and Bedding Plants

Introduction

Ethylene is a natural plant hormone that occurs as a gas in the atmosphere. It acts as a signal molecule to initiate and control many important plant processes such as flower initiation, adventitious rooting and fruit ripening. Unfortunately for many ornamental plants, ethylene causes many negative effects such as bud drop, flower death, leaf yellowing and abnormal flower opening resulting in severe quality loss. Another aspect of ethylene is that plants respond to the ethylene generated internally by the plant itself; ethylene made by plants; and ethylene generated from external sources (e.g. propane heaters, engine exhaust, gas-powered forklifts, and smoke). During shipping, warehousing, and display of potted and bedding plants and cut flowers at the retail store level, there is a high probability of exposure to damaging levels of ethylene, thereby causing major quality loss.

EthylBloc™ Technology is a registered ethylene action inhibitor, which protects plants from both external and internal ethylene. This technology has been shown to be very effective in many ethylene-sensitive species of cut, potted and bedding plants to prevent ethylene damage. Similar to ethylene, 1-methylcyclopropene, the active ingredient of EthylBloc™ Technology is a gas at ambient temperature. Once the powder of EthylBloc™ that contains the active ingredient is mixed with water, the active is released into the atmosphere as a gas. The gaseous molecules attach and occupy the binding sites of ethylene (called ethylene receptors) in plants and thereby block and prevent ethylene from attaching to the site. With no ethylene attached to the receptor, no ethylene damage occurs even in the presence of ethylene in the environment.

The effectiveness of the EthylBloc™ Technology treatment is dependent on 3 factors.

1. Concentration of the active ingredient during the treatment (the higher the concentration, the better efficacy)
2. Temperature at which the treatment takes place (higher the temperature, better efficacy)
3. Duration of the treatment (how long the plants are exposed to a given concentration of active at a given temperature)

Therefore, compared to a treatment done at low temperature (e.g. 40 F), the same level of efficacy can be obtained with a lower concentration of the active ingredient if the treatment is done at a higher temperature for a longer duration.

The EthylBloc™ Technology truck kit comes in two different sizes (38 g and 75 g). Based on the label recommendation, a 75 g kit is required to treat a standard 53-foot truck container, if the treatment is done at 35-55 ºF for 4 to 8 hours. However, if the treatment is done for more than 10 hours at higher temperature (55-75 ºF), a 38 g kit is sufficient for same size truck container. This is because 1-MCP molecules are more active (bind more effectively) at higher temperatures, so a lower concentration is sufficient to obtain the same effect as obtained at lower temperatures. As the majority of the potted and bedding plants are transported at relatively higher temperatures compared to that of cut flowers, this high temperature, long duration treatment is applicable for such situations.

Research

An experiment was conducted in the Floralife laboratory to test the effectiveness of EthylBloc™ Technology at different temperatures for different durations. Three types of tests were examined in this experiment.

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1. Control (No EthylBloc™ Technology treatment)
2. High temperature, low concentration EthylBloc™ Technology treatment (65 ºF, half dose, 12 hrs)
3. Low temperature, high concentration EthylBloc™ Technology treatment (40 ºF, standard dose, 12 hrs)

* Potted and bedding plants (that were not treated with ethylene inhibitor previously) were sourced for this experiment.

The following plants were tested:

1. Potted Dianthus
2. Flats of Petunia
3. Potted Torenia
4. Potted Penta

Plants were treated with the EthylBloc™ Technology atmosphere treatment outlined above in enclosed chambers at the temperatures given above. One day after the EthylBloc™ Technology treatment, the plants in all tests were exposed to 2 ppm ethylene gas at room temperature for 24 hours in an enclosed chamber to induce the response to ethylene. After the ethylene exposure, the plants were held in an interior evaluation room (with 12 hours of light and 12 hours without light, at 68 ºF) for observation and evaluation.

Results

The following photos were taken 5 days after the completion of the ethylene exposure.

Dianthus

Control

Half Rate, 65º F

Full Rate, 40º F

Petunia

Control

Half Rate, 65º F

Full Rate, 40º F

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Torenia

Control | *Half Rate, 65° F* | *Full Rate, 40° F*

Penta

Control | *Half Rate, 65° F* | *Full Rate, 40° F*

Conclusion

All the potted and bedding plant species tested in this experiment were protected from ethylene damage with the use of EthylBloc™ Technology. The ethylene damage symptoms varied depending on the species. Petal in-rolling, wilting and discoloration were observed in Dianthus. The fall of florets was observed in Penta. Petal wilting and discoloration were observed in Petunia and Torenia. Both EthylBloc™ Technology treatments (standard dose at low temperature and half dose at high temperature) were equally effective in preventing ethylene damage.

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