CORF News

California Ornamental Research Federation

Vol. 1, Issue 1 **Fall 1997**

New Floriculture Commercial Ethylene Inhibitor Soon Available

Submitted by Julie Newman, Michael Reid and Linda Dodge

California growers will soon be using a new product to extend the life of ethylene-sensitive flowers. This product contains 1-methylcyclopropene (MCP), an ethylene binding site competitor, and is very promising as a postharvest treatment for both potted plants and fresh cut flowers.

Ethylene gas can shorten the postharvest life of many floral crops, causing flower and bud drop, premature wilting, and floral discoloration.

Stress induces internal ethylene production in sensitive species, but ethylene is also a common atmospheric pollutant.

Research in the mid-70's established that a silver complex known as silver thiosulfate (STS) blocks the attachment of ethylene to plant and flower tissue, regardless of whether ethylene is internally produced or is from external pollution sources such as engine exhaust.

Treating floral crops with this ethylene inhibitor can extend their shelflife significantly.

Despite demonstrated effectiveness, postharvest treatment with STS solutions has not been widely adopted by California growers.

One reason is that the recommended treatment is a 2-step process, consisting of "pulsing" the flowers in STS solutions for a specific time, and then moving the flowers to a standard fresh flower food. This can be cumbersome to manage when treating many buckets of flowers in a day, because the STS treatment period must be carefully timed to ensure effectiveness and to avoid phytotoxicity. In addition, poor mixing, old degraded solutions, and improper temperatures or times of treatment may reduce success.

Another problem with STS is the concern with disposal of spent solutions. Silver is a heavy metal that persists in soil and groundwater for long periods and may pollute drinking water. When absorbed by the body, heavy metals accumulate, and at toxic levels will affect the nervous system. STS's impact on the environment has come under scrutiny by governmental agencies. (In Holland, for example, its use on potted plants and cut carnations is restricted.)

In the U.S., STS can be used on cut flowers and potted plants, but disposal of leftover solutions is controlled.

The legal maximum concentration of silver in waste water, set by the EPA, is 5 ppm, although local municipalities may allow less. Many California floral production areas are located near the coast where there is often extremely low tolerance levels for heavy metals. Since most effective STS treat

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CORF News Welcomes You

by Steve Tjosvold

Welcome to the first issue of CORF News. The goal of this newsletter is to provide educational and research information to California's floriculture industry in a timely manner. The newsletter will include results from industry-sponsored research projects, practical grower topics, industry news, and an industry calendar of events.

Highlighted in each issue will be regional reports on current field research and observations from the four major California floriculture regions by University of California Cooperative Extension Farm Advisors. In addition, U.C. Cooperative Extension Specialists, U.C. professors, Cal Poly professors, and growers will provide articles and information. The newsletter will be published on a regular, 3 month schedule.

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In This Issue

New Publications

by Dr. Ann King

- **Pesticide Safety: A Reference Manual for Growers** (Publ. #3383, $7). The U.C. Statewide IPM Project developed this publication for growers who are preparing for the *Private Applicator Certification* exam through their county Agricultural Commissioner. Growers must now become *Certified Private Applicators* before they can purchase or use restricted-use pesticides. Available from UC-DANR Communication Services, tel. (800) 994-8849.
- **Ball RedBook**, 16th ed. ($72). The new edition of Ball RedBook is now available. It is a standard reference text for commercial floriculture production. Available from GrowerTalks Publishing, tel. (888) 888-0013.
- **Foliage Plant Diseases: Diagnosis and Control** ($69). This new handbook has information on foliage plant health, including recognizing and solving foliage plant problems. Over 400 color photographs. Available from the American Phytopathological Society, tel. (800) 328-7560.
- **Compendium of Chrysanthemum Diseases** ($35). This handbook is a guide to the identification, prevention, diagnosis, and control of chrysanthemum diseases, with 58 color photographs. Available from the American Phytopathological Society, tel. (800) 328-7560.
- **Know Your Plants... Safe or Poisonous?** (single copy free, additional copies 25¢ each). This brochure, written for the homeowner, is useful to retail nurserymen who receive requests on poisonous plants. It also has information for homeowners and growers on plants which cause dermatitis. Available from U.C.C.E., San Mateo County, tel. (650) 726-9059.

Advertising Rates

Your advertising dollars help support the publication of this newsletter. If you would like to advertise in *CORF News*, contact the CORF office at 760/723-0807 for an advertising insertion order and submission deadlines.

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The California Ornamental Research Federation (CORF) mission is to identify the research and educational needs of the California floriculture industry and to meet those needs by offering educational programs, conducted in partnership with growers, floriculture associations, allied industry and research/educators.

Newsletter

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The need of a statewide floriculture newsletter has been recognized for many years. However, it wasn't actively considered by industry representatives and farm advisors with the University of California until the summer of 1996. A CORF planning meeting evaluated the results of a California Cut Flower Commission sponsored "Research Focus Workshop". It was clear at this planning meeting, that some important needs of the industry and the University of California could be met by producing a statewide newsletter. Specifically, a newsletter of this nature could help meet the following identified goals: 1) timely, accurate research-based information to the industry in one publication, 2) improve communication and goodwill between grower and researcher and, 3) increase the cohesiveness of the floriculture industry.

As you might expect, the publication and mailing of this newsletter is expensive. The California Cut Flower Commission has funded the startup costs for the newsletter with the intention that the newsletter would quickly become self sufficient. We are currently sending this newsletter out free of charge to nearly 2700 in the floriculture industry and allied trade. To maintain the free nature we are seeking advertising or sponsorship revenue. Advertising revenue we hope will maintain the no-charge nature but also provide advertisers and sponsors a venue to put promotion dollars that is incomparable to any other publication. Just think how far promotion dollars will go when advertisements are seen and read by nearly every conceivable flower grower and nurseryman in California!

Finally, if you have questions or comments, please send them to me. I hope you enjoy the newsletter and learn something too.

Internet Sites of Interest

Dr. Heiner Lieth, Environmental Horticulture, UC Davis

In each CORF newsletter I will present a variety of web sites with brief notes on what you can find there.

There are a few sites that you definitely want to note: **CORF**, is in the process of setting up a web page. It is located at http://envhort.ucdavis.edu/CE/CORF. At this location you can get up-to-date information on various CORF programs. Although the web site is not set up to accept registrations directly, it is possible to print out the needed forms from there and use these to register. You can also get the latest information on the Floriculture Study tour to the Netherlands there.

The CORF site is maintained at the **Environmental Horticulture Department at the University of California, Davis.** Their home page is http://envhort.ucdavis.edu.

The **California Cut Flower Commission**, a sponsor of many CORF events, also has a web page http://www.ccfc.org.

One area where flower growers frequently have questions relates to pest management. There are quite a few resources in this area. For example, the **University of California Statewide Integrated Pest Management Project** maintains a web page at http://www.ipm.ucdavis.edu where one can get a lot of information regarding pests on horticultural crops. Their pest management guidelines contain a lot of information on managing various pests.

You can also find information regarding pesticides and their use and regulation on the web. For example, the **California Environmental Protection Agency Department of Pesticide Regulation** has a web page (http://www.cdpr.ca.gov/docs/usepa/usepa.htm) that provides a lot of information on pesticide products. Brief registration information on approximately 89,000 products is currently online.

The **US EPA** is also accessible (http://www.epa.gov); from that page you can explore such mind-numbing reading as the Federal Register.

There is also non-regulatory information on pesticides. At **EXTOXNET** (http://ace.ace.orst.edu/info/extoxnet/pips/ghindex.html) you can get toxicity information on a multitude of materials.

If you need a Material Safety Data Sheet for some compound you can find it if you start at a site (http://www.chem.uky.edu/resources/MSDS.HTML) set up by the **Chemistry Department at the University of Kentucky.**

Note, if you are on-line and want to explore these links, then you can do this without typing in each of the addresses above. Simply find this article located at http://envhort.ucdavis.edu/jhl/info/links97.htm where each address is hot-linked.

If any of this sounds interesting to you, but you don't know how to get at this stuff, then you will want to attend one of CORF's Internet training sessions. The next one is in September 1997 in the Carpinteria area.

Industry Support for Newsletter

by Dr. Ann King

CORF News will have regular input by university researchers and educators, growers, and the allied floriculture industry. By having all of these groups interact on the newsletter, the needs of the entire industry can be identified and met in a collaborative effort. Grower and industry support for the newsletter is strong.

Michael Anthony Mellano of Mellano & Company in San Luis Rey said, "This newsletter should have been done years ago! The newsletter is a good way to specifically address the needs of the ornamental industry in California. CORF NEWS is a forum for growers, industry, and researchers to interact and consolidate their programs. By doing this, everyone can maximize the use of their time and efforts."

Harrison Higaki of Bay City Flower Company in Half Moon Bay supports CORF's newsletter. He notes that "With all the rapid changes that we are facing today, we need a vehicle to facilitate better communication between growers and researchers. The challenges are too great for growers or researchers to meet alone." Higaki feels that CORF NEWS will allow for the two-way communication.

Dave Pruitt of Sea Coast Greenhouses in Leucadia said that this newsletter will "revitalize the connection between growers and researchers, and will allow for stronger communication among the entire floriculture industry." He notes that communication between growers and researchers is not as strong as it once was. In future issues of CORF NEWS, Pruitt would like to see information on ongoing research, what it could lead to in the future, and how growers can use research information to try new production methods.

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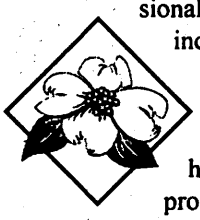
Regional Report

Santa Cruz & Monterey Counties

by Steve Tjosvold

I am a University of California Cooperative Extension farm advisor in the Monterey Bay Area. My speciality is environmental horticulture.

In my case, I work with growers of flower, nursery, sod, and Christmas tree crops and work with professionals in the landscape industry such as public and private maintenance contractors and landscape architects. I also have a Master Gardener program which trains volunteers to answer the public's local gardening questions and work on community projects related to gardening.



My time is most often spent working with the commercial floriculture and nursery industries in my area. The growers in this area produce over $189,000,000 worth of ornamental products from approximately 29 million square feet of greenhouse production and 800 acres of field operations. The cool summers and relatively warm winters with lots of sunshine make the area very desirable for the production of ornamental plants and cut flowers. Cut roses is a major ornamental product in this area, the growers here produce over 50% of the domestic production.

Besides consulting with growers and landscape professionals on the phone and in the field, planning and implementing educational programs, I invest substantial time on various research projects.

Two research projects with cut roses right now emphasize the need for information on the new "arching" training of roses. Most observations in the field suggest a benefit of this training over conventional training and pruning techniques. In a local nursery, I'm looking at how the production and quality of roses are affected by this training technique for 5 rose varieties soil-grown (not hydroponics, as some growers are doing). So far, after several months of data collection, it appears that the arching technique is beneficial for most varieties. I'm colloborating with Dr. Heiner Lieth on other complimentary work at U.C. Davis relating to the efficiency of the arching technique.

There is some observations that the arching technique creates a leaf canopy more suitable for the successful use of predatory mites. I'm trying to see if predatory mites work in controlling spider mites in the arched systems that are set up for the production experiment. Dr. Michael Parrella at U.C. Davis is colloborating on this project.

Other research projects that I'm directing or collaborating with other researchers are:

1. the control of powdery mildew on roses with sulfur vaporization,
2. implementing IPM scouting programs in roses, carnations and other ornamental crops,
3. evaluation of commercial miticides,
4. evaluation of biological control agents for prevention of Fusarium wilt on carnation, and
5. evaluation of new and commercial herbicides in field grown cut flowers.

Field Observations

New Pest & Diseases

Carnation "Fireing"

I have made many observations in carnation nurseries where the older, lower portion of the carnation plant's leaves have become completely dried, almost like it was burned to a tan color. The younger, upper, leaves and growing points are relatively unaffected. It appears that certain varieties are more susceptible. The problem is always uniformily found through the entire bed. No plant pathogens have been identified. Associated with this symptom is the use of horticultural oils or insecticidal soap. Observations indicate that these pesticides may dissolve the waxy "bloom" off of leaves. I suspect that excessive use of these pesticides might be dehydrating the older leaves. It appears that spider mite damage might aggravate the problem. At this time, it is not clear what is a safe spray schedule with these pesticides on susceptible carnation varieties.

Cottony Rot More Common

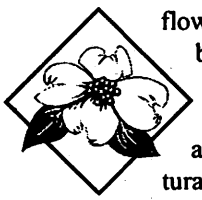
Sclerotinia sclerotiorum, for the first time, has been found causing disease in carnation. Infections girdle plants and dead stems often take on a bleached, white color. In addition, it has been found attacking other greenhouse cutflowers (snapdragons, stock and aster) that had followed a diseased carnation crop. In that case, the soil was not sanitized with steam or methyl bromide to kill the soil inhabiting fungus. The disease can often be identified in the field by the presence of brown to black seed-like sclerotia which often are found on the plant's girdled stem.

Regional Report

San Diego County

by Karen Robb

San Diego County is the leading producer of floriculture and nursery crops in the United States. Ornamental crops comprise 62% of the county's crop value for 1996, with a value of $692,105,636. A tremendous variety of container nursery, cut flowers and foliages, preserved flowers and foliages, potted flowers and foliage plants, bedding plants, and propagative materials are produced. Virtually any commercial floricultural product is grown somewhere in this county.



San Diego County growers also tend to produce on small acreage. Of all farms in the county, 65% are nine or fewer acres, and 90% are 49 or fewer acres.

San Diego County has an environment particularly suited to ornamental plant production. It has mild temperatures (the average annual temperature is 63.2 degrees), sunshine 70% of the time and relatively long hours of sunshine in winter. All this makes San Diego County especially conducive to the production of high quality plants and flowers.

Although the climate in this county is superb for ornamental plant production, growers here do have to contend with poor soil and high water costs. Our ag water rates are more than 30 times those of the Central Valley Project or Imperial Irrigation District. Not surprisingly, growers here are very efficient in water use.

The large number of growers and diversity of crops grown in this county makes my position as Floriculture and Nursery Crops Farm Advisor very interesting and challenging. There is never any scarcity of questions or problems to research!

Like other Farm Advisors I have found that pest management related problems make up the majority of requests I receive for information or assistance. Pest management, therefore, is a major focus of my research program. I, too, am cooperating in the statewide IPM scouting program, along with Julie Newman, Steve Tjosvold, Ann King and John Kabashima. We are currently conducting trials on nursery plants, potted plants, and cut flowers and foliage.

Monitoring for infective thrips and tospoviruses (TSWV/INSV) is another major project in which I am currently involved in cooperation with Dr. Diane Ullman. We are investigating the use of new ELISA technology and the use of petunias as indicator plants to refine and improve monitoring and control strategies for western flower thrips. We are moving into our second season of field research and the results to date have been very exciting. This will be a topic featured in an upcoming newsletter.

Other program focus areas include: integrated pest management strategies for pests of ornamental crops; biological control in field and greenhouse grown crops as well as in the landscape, development of a recycling program and manuals for ornamental crop producers, development of 'Best Management Options' to assist growers in compliance with non-point source pollution legislation, and the development of resource directories for supplies, services and information sources.

Field Observations

New Pest & Diseases

Chrysanthemum White Rust

We have had our first find of the dreaded chrysanthemum white rust in San Diego County. Federal protocols are being followed and surveys are in progress to ascertain the extent of the problem. To date, only one grower has been found to have this pest.

This disease is found only on chrysanthemums and other *Dendranthema sp.* and is characterized by distinct round yellowish spots on the upper leaf surface and pinkish to tan pustules on the lower leaf surface. Systhane is the only fungicide registered for control of this fungus in California.

Downy Mildew on Limonium

Downy mildew has been found on the 'Misty' hybrids in San Diego County. This is the first record of this disease on *Limonium*. This disease causes yellowing and browning of foliage in wide patches. A clear to brown fuzz can be observed on affected plant parts. Control recommendations include reducing humidity, keeping plants dry, and increasing temperatures.

Sunflower Leaf Smut

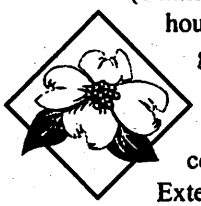
This smut has been found in San Diego County. It is characterized by white spots on the leaves. There are no materials registered for control of this fungus. The only control recommendation is to avoid planting repeatedly in the same soil.

Regional Report

San Mateo & San Francisco Counties

by Dr. Ann King

Floriculture in San Mateo County continues to be the primary agricultural industry, with an annual farm gate value of $170 million (82% of the county's agricultural value is from floriculture). Two-thirds of the floriculture industry is greenhouse-grown crops (6 million square feet of greenhouse), and one-third is field-grown crops.



Most requests for information from our county Cooperative Extension office are related to pest management - such as insect and disease identification, control methods, and reducing pesticide use. We also receive requests for information on new crop production, soil management and nutrition (especially in potted plants), and postharvest handling. New growers also want information on marketing and production costs.

One of my ongoing research projects is part of a **statewide Integrated Pest Management project** with Julie Newman, Karen Robb, and Steve Tjosvold in U.C. Cooperative Extension. We are looking at the cost efficacy of using professional scouts to monitor pest levels in ornamental crops. As part of this project, we are conducting regional training programs for growers on integrated pest management, and preparing field materials on pest identification.

I am also conducting **herbicide trials on field flowers**, in cooperation with Clyde Elmore from UC Davis, in an attempt to get more herbicides labeled for flower crops. The trials are being conducted with Half Moon Bay growers, and at the U.C. Bay Area Research and Extension Center in Santa Clara. This project is sponsored by the California Cut Flower Commission.

Because of the large potted plant industry in this area, there is an ongoing problem with **fungus gnats and shore flies** in greenhouse production. Current research projects are looking at effective and safe ways to control these insect pests.

I just completed a new publication, ***Know Your Plants... Safe or Poisonous?***, in conjunction with Elise Stone of the new statewide California Poison Control System. It has information on plants which are toxic when eaten, and plants which cause skin dermatitis. This publication is useful to retail nurserymen who can distribute it to the public, and to growers who have problems with dermatitis among their employees. See the New Publications column for information on ordering the publication.

I am developing a more extensive list of plants causing dermatitis - it will soon be available on the Internet. This information should be very useful to growers and field workers who have problems with plant dermatitis and skin allergies.

Many local growers attended CORF's recent *IPM Scouting Workshop* in Half Moon Bay, where they learned how to identify pests of floriculture crops, an dhow to set up a monitoring program. Similar workshops will be held in southern California in upcoming months.

Local field flower growers should watch for an upcoming **workshop on cover crops**. It will be held in Half Moon Bay in October.

Field Observations

New Pest & Diseases

Fungus gnats and shoreflies are an ongoing problem for greenhouse potted plant growers. Growers are using biocontrol products such as *Bacillus thuringiensis* var. *israelensis* (Gnatrol), parasitic nematodes (X-Gnat), and other materials for fungus gnats. These products work well on fungus gnats, but they need to be used regularly, and before insect populations get too high. Make sure you correctly determine if you have fungus gnats or shoreflies -- biocontrol products may not work equally well on both pests. Shoreflies may need more traditional chemical drenches or different biocontrol products. *(Remember -- always check the product label to make sure it is labeled for your crop.)*

Rose growers who are using rockwool and other hydroponic substrates need to watch for spread of **bacterial crown gall** in their circulation systems. Always inspect new plants for signs of crown gall or other pathogens. Once these pathogens get into the circulation system, they are difficult to control, and they can easily infect the entire crop. Prevention is the rule-of-thumb in hydroponics.

With wet weather approaching, watch for **botrytis (gray mold)** on you flowering crops. If predictions for a very wet winter are true, due to El Nino, we may see a lot of botrytis during the coming months. Contact your Farm Advisor if you have a lot of botrytis problems.

Regional Report

Ventura & Santa Barbara Counties

by Julie Newman

I am an environmental horticulture advisor with the University of California Cooperative Extension. Although my office is based in Ventura, I work with the floriculture and nursery industries in both Ventura and Santa Barbara Counties. I also have programs for the interior landscaping industry and in public horticulture education.

Ventura and Santa Barbara Counties make up a major ornamental production area in California with a gross wholesale value of $198 million in 1995, encompassing nearly 6000 acres of greenhouse and field-grown crops.

Cut flowers and greens are important agricultural commodities in the two counties. The value of cut flowers and greens doubles the value of potted plants in Santa Barbara County and triples the value of potted plants in Ventura County. Other important floriculture crops are bedding plants, flower seed crops and propagation material.

As an advisor, I receive numerous requests for information. Since many of these requests concern floriculture pest management issues and because the industry continues to identify pest management as a critical issue, much of my research and educational outreach concerns biological control and integrated pest management. As Ann mentioned, we are developing demonstration sites to examine the cost and effectiveness of IPM scouting programs. I have two demonstration sites in Ventura County on bedding plants, poinsettias, and gerberas and two sites in Santa Barbara County on roses and lisianthus. I am incorporating biological control in all of our demonstration sites. I am currently developing a fifth demonstration site in Lompoc.

In addition, I am working with Dr. Diane Ullman at UC Davis to evaluate the use of petunia plants as indicators for tospoviruses (tomato spotted wilt virus and impatiens necrotic spot virus) on lisianthus and chrysanthemums. We will visit this nursery on our CORF tour in Carpinteria on September 11.

We are gearing up for our statewide CORF scouting workshops which will begin this month. The CCFC funded our proposal to print the educational materials we developed last year for these workshops.

In addition, I have been working with the CCFC on a laminated poster which can also be used as a pocket field guide on floriculture pests, natural enemies, and diseases. This poster will be part of the instructional packet for participants in the CORF scouting workshops. They will also be available for purchase from the CCFC.

Additionally, I have developed a county publication on scouting which will be available at this year's workshops.

I recently completed a postharvest research project evaluating MCP and other anti-ethylene products with Dr. Michael Reid and Linda Dodge at UC Davis. Some of our results our presented in this issue.

Field Observations

New Pest & Diseases

Tomato spotted wilt virus (TSWV) & impatiens necrotic spot virus (INSV) affect more than 500 species of plants, including many orna-mental crops. Control of the western flower thrips is critical because TSWV and INSV are typically transmitted by this insect. Growers can diagnose these viruses on-site within hours through the use of com-mercial plant virus test kits. Also several cultivars of petunias can be used as indicator plants.

Phyllocoptes bougainvilleae is a brand new mite species which so far has been found only in Santa Barbara County on bougainvillea. It has been reported in numerous nursery and commercial landscape situations. It feeds on the new growth of bougainvillea, distorting the foliage and flowers. Fortunately, it is easy to control with acaricides because it feeds on the surface of foliage and not inside buds or galls, as is the case with fuchsia gall mite or citrus bud mite, two other Eriophyidae mites.

Giant Whitefly has been found in avocado orchards and on certain landscape plants but has not yet been observed in nurseries. University scientists, San Diego County Weights and Measures, and the CDFA are examining new natural enemies for biological control. Good results have been reported in some sites with a new parasitic wasp (*Entedononecremnus* sp) recently introduced from Texas. Jerry Davidson, Entomologist with the Santa Barbara County Agricultural Commissioner, is testing these new parasitic wasps in Goleta field sites.

Ethleyne Inhibitor
Continued from page 1

ments contain from 100 ppm silver, it is necessary to remove the metal by passing it through a silver recovery system similar to that used by the commercial film processing industry.

Several fresh flower food manufacturers have developed alternative anti-ethylene products with the aim of eliminating some of the problems associated with the use of STS.

However, we conducted experiments to evaluate these materials at U.C. Davis and at California packing houses and supermarkets, and found that these products either do not contain enough silver to be effective or contain inhibitors of ethylene biosynthesis. Inhibitors that reduce internal ethylene naturally produced by plants and flowers do not protect sensitive flowers exposed to external ethylene.

In contrast, we found that the new anti-ethylene compound MCP dramatically increases the display life of plants and flowers exposed to ethylene contaminated environments. Response varies with plant species.

Potted plants such as miniature rose and begonia show as much as 300% increase in shelflife over controls, while MCP treated kalanchoes last over 600% longer than untreated controls.

For cut flowers such as carnations, penstemon, snapdragons, and stock, MCP treatments result in display life that is extended over 200%.

MCP treatments also improved vaselife for alstroemeria by 136%. (See Tables 1-2.)

Our research compared MCP treatments with standard STS pulsed treatments and found that the effects of MCP were not significantly different.

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What Is Ethleyne?

Many floral crops are sensitive to a common atmospheric pollutant called ethylene. It is particularly insidious because it is a colorless gas that is difficult to detect, and is active at minute concentrations.

Ethylene induced injuries include premature wilting in carnation and kalanchoe; flower discoloration in orchid; shattering and flower or bud drop in alstroemeria, lily, snapdragon, delphinium and rose. It accounts for an estimated 25-35% of all floral crop losses.

Ethylene is produced in small quantities by naturally ripening fruit and by floral crops themselves as they age. It is also produced by some bacteria and common fungi, and by rotting vegetation. It is present in cigarette and wood smoke, and exhaust from gas heaters and internal combustion engines.

Exposure to external ethylene gas initiates the biochemical path which ultimately increases internal ethylene production in sensitive species. It is used commercially to force bromeliads into flower and to hasten the ripening of bananas and tomatoes.

Recommendations for Ethleyne Sensitive Crops

To maximize plant and flower life of ethylene sensitive crops, avoid external ethylene sources. Do not operate internal combustion engines in or near refrigeration units and keep ripening fruit away from flowers. Discard flowers that show signs of aging and clean your flower buckets; good sanitation practices can go a long way to eliminate ethylene produced by decaying plant material and fungi. Ventilate storage or display areas with ethylene-free air.

The use of ethylene scrubbers that force air across inert beads impregnated with the chemical absorbant potassium permanganate is also effective in storage areas.

Internal ethylene production and activity is reduced with cooler temperatures. Operate refrigerated storage at the lowest temperature possible without causing chilling damage. For most crops this is at 32 F (0 C), but tropical crops such as anthuriums, bird-of-paradise, ginger, and some orchids can be injured at temperatures below 50 F (10 C).

Postharvest anti-ethylene treatments can be effective in reducing injury for sensitive species. However, growers may need to try them out on a small scale to determine appropriate temperature and treatment times if specific instructions are not provided by the manufacturer. Analysis of the silver concentration of STS products at an independent lab is also advised at least once per year. Our data show that the formulations of these products change, and there seems to be a trend towards using less silver. Some products which were very effective in tests performed a few years ago did not protect flowers from ethylene exposure in recent experiments because they did not contain adequate amounts of silver. The only commercial STS product which consistently contained adequate levels of silver during a three year evaluation was Silflor (Floralife, Burr Ridge, Il.). (See Table 3).

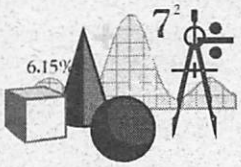
Ethleyne Inhibitor

Continued from page 8

However data for MCP treated gypsophila showed that MCP was less effective than STS treaments.

It appears that in this species, MCP offers some protection for fully open flowers, but not for buds that will develop later.

The more stable STS complex is effective in protecting all floral stages, and is therefore still superior in extending display life for this floral crop.



MCP's ease of use and safety may promote wider use by the flower and nursery industries. MCP is a gas, like ethylene, and can be applied to floral crops in closed greenhouses just before harvest, in storage, or in display coolers, truck trailers, or shipping containers. There are no disposal concerns as with STS.

MCP will be commercially produced by Biotechnologies, Inc. (a subsidiary of Floralife). The company plans to sell the product as a powder which is mixed with a solution that activates the gas. The projected release, pending EPA approval, is this fall or early next year.

The often spectacular inhibition of ethylene induced damage in potted plants and cut flowers treated with MCP gas suggest that this compound may be the alternative to STS that the industry has been seeking.

Acknowledgements:

We would like to thank the California growers who donated plant material and cooperated on this project. Technical support from Juan Carlos Cevallos, Anna Meyers, Sue Mills and Rosa Valle is also gratefully acknowledged. This research was supported in part by funds provided by the American Floral Endowment and the Hansen Trust.

TABLE 1: Display life of potted plant species after treatment with nothing (control), STS, or MCP, and then placed in environments containing 0.5 to 1.0 ppm ethylene at room temperature.[1]

Species	Treatment	Flower Life (Days)	% Increase Over Control
Begonia	Control	2.3	—
'Rosa'	STS	7.5	326%
	MCP	7.3	317%
Rose	Control	3.3	—
'Victory Parade'	STS	9.3	282%
	MCP	9.0	273%
Kalanchoe	Control	2.0	—
'Tropicana'	STS	14.0	700%
	MCP	13.3	665%

[1] Adapted from published work by Serek, M., E.C. Sisler, and M.S. Reid. 1994. J. Amer. Soc. Hort. Sci.119(6):1230-1233.

TABLE 2: Display life of fresh cut flower species after treatment with nothing (control), STS, or MCP and then placed in environments containing 0.5 to1.0 ppm ethylene at room temperature[2]

Species	Treatment	Flower Life (Days)	% Increase Over Control
Alstroemeria	Control	5.0	—
	STS	6.8	136%
	MCP	6.8	136%
Stock	Control	2.3	—
	STS	5.0	217%
	MCP	5.0	217%
Carnation	Control	2.3	—
	STS	5.3	230%
	MCP	5.8	252%
Penstemon	Control	1.8	—
	STS	5.3	294%
	MCP	5.3	294%
Snapdragon	Control	3.0	—
	STS	6.3	210%
	MCP	6.5	217%

[2]Adapted from published work by Serek, M., E.C. Sisler, and M.S. Reid. 1995. Plant Growth Regulation 16:93-97.

TABLE 3: Analysis of the silver content of commercial ethylene inhibitors and a laboratory preparation of STS from experiments conducted in 1993 and 1996

Product	Recommended time in solution	Ag+ in solution (ppm) 1993	1996
Chrysal AVB	2-72 h	25	0
Rogard RS	Continuous	7	2
Silflor	1-2 h	115	100
STS 1mM	16-24 h	91	107

UC Riverside Department of Entomology

With the involvement of nine laboratories and over 30 people, The Department of Entomology at the University of California, Riverside is a world leader in the development of new strategies to control insect pests found in flower and nursery crops.

Current projects span all of the major insect pests found in flower and nursery crops and the entire realm of issues affecting insect pest management including: chemical control, biological control, plant resistance to insects, cultural control, physical control and the use of barriers, sampling and detection, behavioral disruption (use of pheromones), integrated pest and crop management to reduce insect populations, and the management of plant disease transmission by insects.

Additionally, there are always ongoing projects focused on the basic biology, life history, and suitable control approaches for the continual influx of new insect pests into the state.

The efforts in flower and nursery crop entomology are managed within the department by Drs. Tim Paine, Heather Costa, and Rick Redak. For more information please call 909-787-4420.

Submitted by Dr. Richard Redak
Depart. of Entomology
University of California, Riverside

Ursula Schuch Resigns Position

Dr. Ursula Schuch, formerly Extension Nursery Crops Specialist in the Botany and Plant Science Department at UC Riverside, accepted a research and teaching position in nursery crop management at Iowa State University. She resigned her UC Riverside position on May 31, 1997.

While at Riverside, Dr. Schuch developed a very productive research and education program that was directed at the primary issues that face the California Nursery Industry, including water use, conservation and quality; fertility management; growth regulator use; and other cultural practices for optimum nursery plant growth and development.

At the present time, the replacement of the nursery specialist postion is in question because of continuing budget reductions.

Submitted by Vic Gibeault
Dept. of Botany & Plant Sciences,
University of California, Riverside

Fusariuum Wilt Studies

Jim MacDonald (Plant Pathologist from UC Davis) has been collaborating with Steve Tjosvold to identify alternatives to methyl bromide for Fusarium wilt of carnation.

Results from two years of experiments have shown that no treatment (methyl bromide, methyl iodide, asamid, or heat) provides effective control (i.e., more than 12 months) in heavily-infested ground beds. Effective control has only been achieved by converting production to raised beds (which do not contact the ground) and using steam to treat soils before planting. Experiments to limit Fusarium recolonization of steam-treated beds are in progress.

Submitted by James MacDonald
Department of Plant Pathology
University of California, Davis

UC Davis On the Web

The Department of Environmental Horticulture at UC Davis has a worldwide web site that provides information on its undergraduate and graduate programs including course descriptions, specific information on research activities of faculty, staff and affiliates, activities of students, a virtual tour of the Department, the Department's outreach publication, *Growing Points*, on-line publications created by faculty and other interesting sites on the worldwide web. The web site is in constant evolution as we more fully embrace the worldwide web as a convenient and effective way of disseminating information. Visit us at: http://envhort.ucdavis.edu/.

Submitted by Dr. David Burger,
Dept. of Environ. Horticulture,
University of California, Davis

Ultraviolet Control of Pathogens in irrigation water

Dan Downey and Ken Giles in the Department of Biology and Agricultural Engineering, University of California, Davis, are investigating the use of ultraviolet (UV) light for control of pathogens in recycled irrigation water.

While UV treatment of municipal water is a common practice, adapting the equipment for use with irrigation water is complicated by the turbidity, of cloudiness, of the water.

The lack of data makes design and economic analyses of UV treatment for ag water difficult. A computer model has been developed to predict efficacy of UV treatment for various treatment configurations and water qualities.

Submitted by Ken Giles
Dept. of Biology & Agri. Engineering
University of California, Davis

New Undergraduate Major at UC Davis

The Department of Environmental Horticulture at the University of California, Davis is now offering its own undergraduate major entitled Environmental Horticulture and Urban Forestry (EHUF).

The major was formally approved in the Fall, 1995 and already has over 45 students enrolled. Students majoring in EHUF learn how plants improve the environment and the quality of our lives.

The focus of the major is on the biological and physical concepts and horticultural principles of plant production, management of plants and plant ecosystems in landscape settings and sociological aspects of plant/people interactions in the urban environment.

Plants are used to revegetate and restore disturbed landscapes, control erosion and reduce energy and water consumption. The ornamental use of plants to improve the aesthetic quality of urban and rural landscapes, recreational areas, interiorscapes and commercial sites is an important aspect of this major.

Areas of Specialization within the major include: Floriculture/ Nursery, Landscape Management/ Turf, Urban Forestry and Plant Biodiversity.

Submitted by Dr. David Burger, Dept. of Environ. Horticulture, University of California, Davis

New Grants for Entomology Department

Two new grants have recently been awarded to Dr. Michael Parrella's laboratory. The first if from the California Department of Pesticide Regulation (DPR) and involves the development and implementation of IPM strategies for Aphids on Lilies. 85 projects were submitted from researchers all over California, and only 21 were selected for funding.

Our research project is in conjunction with Deborah Giraud (Farm Advisor in Humboldt and Del Norte Counties) and the work will largely be done at Sun Floral Valley Farms in Arcata. We will be using natural enemies as well as the biorational products BotaniGard and Cinnacure. It is noteworthy that the manufacturers of these products and the cooperating grower are also contributing financially to this project.

The second research grant is from the Fred C. Gloeckner Foundation Inc. (based in Harrison, New York) to examine the integration of natural enemies and biorational pesticides. Some of this work pertains to the lily project in Arcata, but we will also be investigating the compatibility of biorational materials with the natural enemies of whiteflies and thrips.

Submitted by Dr. Michael Parrella Department of Entomology University of California, Davis

Industry Support
Continued from page 3

Steve Siri of Glad-A-Way Gardens in Union City said that CORF NEWS "is a good venue for keeping everyone apprised of what is going on in the entire industry. It is a way of getting research information to growers, and putting growers in touch with research projects funded by the California Cut Flower Commission." Siri would like to see the newsletter cover a broad range of topics, including pest management, new production methods, and information on new crops.

Lee Murphy of the California Cut Flower Commission said, "CORF NEWS will provide educational material in a cohesive format to all of the fragmented groups in the floriculture industry. Too often we have had to rely on information that was scattered piecemeal in different places. This newsletter will be a focal point for the industry and will be a reliable source for the 'California way' to grow and market flowers."

The editorial committee for CORF NEWS welcomes grower, industry, researcher, and educator input. Please contact U.C. Farm Advisors Ann King, Julie Newman, Karen Robb, or Steve Tjosvold if there are topics that you would like to see addressed in future issues.

Positions Available at San Luis Obispo

Cal Poly, San Luis Obispo, Environmental Horticultural Dept.is seeking a new department head.

David Wehner, the current head, will become an Associate Dean for the College of Agriculture.

Starting September 1, Virginia Walter will serve as interim department head, continuing until the new department head comes on board.

Interested applicants may contact the department office at 805-756-2279 for information and applications.

CORF News is the quarterly publication of CORF, the California Ornamental Research Federation, a statewide partnership of growers, floriculture associations, allied industry and research/educators whose mission is to identify and meet the research and educational needs of the California floriculture industry.

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Upcoming Grower Educational Events

October 15, 1997
Grower Business Mgmt Seminar:
Labor & Employment Laws
San Jose, CA
CCFC, 916/852-5166

October 16, 1997
Grower Business Mgmt Seminar:
Labor & Employment Laws
Carpinteria, CA
CCFC, 916/852-5166

October 21, 1997
IPM Scouting Workshop
Goleta, CA
CORF, 760/723-0807

November 2 - 8, 1997
The Tour to the Netherlands
Aalsmeer and NTV
CORF, 760/723-0807

December 4, 1997
IPM Scouting Workshop
Orange County, CA
CORF, 760/723-0807

February 23, 1998
IPM Scouting Workshop
San Diego, CA
CORF, 760/723-0807

A Word of Thanks . . .

KEE KITAYAMA
Research Foundation

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