CORF News

California Ornamental Research Federation

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Using Petunia Indicator Plants to Monitor Tospoviruses in Ornamental Plants

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No cure for tospoviruses, such as tomato spotted wilt virus and impatiens necrotic spot virus, is currently available. The current recommendations for controlling tospovirus epidemics are to control thrips and to rogue infective plants. Monitoring thrips transmission of tospoviruses with petunia indicator plants gives growers important information for making pest management decisions and directing methods of suppression where they will have the greatest impact.

To understand how monitoring with indicator plants works, one needs to understand the complex relationship between tospoviruses and the thrips vectors. Most importantly, an individual thrips can only infect a plant if it has acquired the virus as an immature. Infective adult thrips can transmit the virus to healthy plants by feeding for as little as 15 minutes, and they retain the ability to transmit the virus throughout their adult life. A thrips that did not feed on an infected plant while immature cannot acquire or transmit the virus as an adult, even if it feeds on infected plants as an adult.

Petunia indicator plants show distinctive local lesions when infective thrips feed on them. Lesions appear as small brown to black spots on the leaves, which look very different from the whitish feeding scars left by noninfective thrips. Local lesions result from a hypersensitive response which is the strategy used by the petunia as protection from the virus. In a hypersensitive response, the tissue around the virus entry site dies rapidly preventing the virus from spreading and causing a system wide infection in the plant. Local lesions are apparent on petunias about 3-7 days after feeding by an infective thrips.

Not at all petunias are created equally when it comes to serving as indicator plants. Research at UCD has shown that 'Carpet Blue', 'Summer Madness', and 'Burgundy Madness' rapidly produce easily recognized lesions. Petunias are an excellent choice as an indicator, because the plants do not support thrips development and seldom become systemically infected. As a result, the plants do not serve as a source of the virus or additional thrips.

We have demonstrated the efficacy of monitoring for infective thrips using petunia indicator plants in conjunction with directional sticky traps in field-grown ranunculus and greenhouse grown potted flowering crops. In our trials, monitoring stations were placed at the edges of each field or greenhouse, and among the crops. Each station contained directional sticky traps (north, south, east and west facing traps) and a plant stand for the petunias. The traps and plants were changed weekly.

Petunia indicator plants used in conjunction with the sticky traps have provided valuable insight about the

See Tospoviruses - Page 9

Postharvest Management

Transportation Temperature Monitoring

By Lee Murphy, California Cut Flower Commission

A transportation temperature monitoring study has revealed the need for continued improvement of flower temperatures along the transportation chain. Based on these findings, the decision was made to develop a pilot trial program called California Fresh. In the coming summer, cooperating growers will ensure that flowers leaving their farms have been pre-cooled below 35° F. Special time/temperature indicators will be placed on the sleeves of two bunches of flowers within each box. These indicators change colors when the flowers are exposed for more than one day to temperatures above 41° F.

Participating high volume wholesalers will check the temperature indicators. University of California post harvest physiologist Michael Reid, agricultural engineer Jim Thompson; and Extension advisor Steve Tjosvold are leading the study.

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New Publications

Dr. Ann King, Farm Advisor, UCCE

IPM Guidelines for Floriculture; UC Publ. #3392, 1999, 77 pages, $5.00; from DANR Publs, (800) 994-8849; also available at www.ipm.ucdavis.edu

Fungicides in Crop Protection, by H.G. Hewitt; 1998. An excellent reference book for pest management professionals who need to understand fungicide action, chemistry, and resistance management. Includes descriptions of new chemistries that are coming on the market. From CAB International, New York, NY; tel 212-726-6490.

Nitrogen and Water Management for Coastal Cool-Season Vegetables; UC DANR Publ. #21581, 1998; (800) 994-8849

Upcoming Grower Education Events

Irrigation Managment Training

Designed for growers who are ready to fine-tune their irrigation practices, this workshop will focus on helping growers evaluate and improve their irrigation system distribution and efficiency, maximize their water utilization and reduce runoff. Included in the discussion will be using tensiometers for monitoring soil moisture. 11 AM - 4:30 PM. CDPR PCA continuing education hours pending approval. Lunch is not guaranteed for late registration.

UC SOUTH COAST EXTENSION CENTER, IRVINE: April 27

CORF Growers' School: Basic Principals of Flowering Bulb Crops and Lilies

Dr. August De Hertogh, professor of Horticulture from North Carolina State University, Author of the "Holland Bulb Forcers Guide", and world-renowned expert on flowering bulb crops, will be with us to start off the inaugural "Grower's School" Series for CORF. This initial program will focus on the basic principles for producing crops from flowering bulbs, followed by a more focussed session on Lily production. The Growers' School will be followed by an optional dinner (requiring separate registration) and an informal discussion session. You may also register for the dinner only. At-door registration as space permits only. 2 PM - 5 PM CARLSBAD (The Raintree): May 11 Sponsored by The Flower Fields at Carlsbad Ranch, The San Diego Co. Flower & Plant Assoc., and Mellano & Co.

Bugs, Bugs, Bugs — An Insect Management Day

This one-day program will focus on the major insect and mite pests of floriculture and nursery crops and how to control them. Included in the discussion will be cultural controls, scouting methods, registered chemical controls, timing and application of chemicals and insecticide resistance management strategies. The

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Dow AgroSciences *The following article is sponsored by Dow AgroSciences*

The active ingredient in Conserve*, spinosad, is produced by a naturally occurring actinomycete known as *Saccharopolyspora spinosa.* "Spinosad" is a coined term used to describe various metabolites produced by this microorganism. Conserve is a revolutionary product in that it uniquely combines the efficacy of synthetic pesticides with the benefits of biological products. The original microbe was discovered in a soil sample collected by an Eli Lilly isolation chemist in the early 1980's. When a fermentation sample showed positive results against dipterous and lepidopterous larvae, the product was advanced for priority development and was introduced as the agricultural insecticide, Success*.

First introduced in California in 1998, Conserve has become the top choice in field flowers, nursery ornamentals and turfgrass as a stand-alone treatment for rapid control of lepidopterous pests such as diamondback moth, beet armyworm, black cutworm and cabbage looper. Active via ingestion and contact, Conserve has speed of kill comparable to most synthetic pesticides. It acts significantly faster that *bt* bacteria, Beauveria fungi, and other traditional biologicals. Feeding stops immediately, and mortality usually occurs within hours.

Conserve is highly active against floricultural pests such as leafminers and thrips. Although not systemic, Conserve does have translaminar activity for control of leafminers in both the adult and larval stages. Western flower thrips are effectively controlled at the low rates of 6-12 oz/100 gallons. Activity on mites has been variable and appears to be rate dependent, but can be improved by tank mix with an appropriate horticultural oil. Sucking pests such as aphids, whiteflies and scales are not significantly controlled by Conserve. No phytotoxicity even to open blooms has ever been reported from the use of Conserve.

Conserve is practically nontoxic on important beneficials such as lacewing, pirate bug, lady beetle and predatory mites. Although bees and wasps are sensitive to Conserve, it is significantly less toxic than most synthetic pesticides. Because of its low toxicity to nontarget species, spinosad preserves, or conserves, most beneficial insect populations. Residual activity is limited by UV exposure, and may vary from a few days outdoors to a few weeks under glass.

Conserve has now also been registered in California for use in greenhouses, where it's four-hour re-entry period, Caution label, and "reduced risk" status make it a strong choice for effective, economical control of leps, thrips, leafminers and some other pests. Featuring a mode of action totally different from other insecticides, Conserve is an excellent rotational treatment in resistance management programs. Outdoors, Conserve is also labeled for highly effective drench treatment of Red Imported Fire Ant mounds, and a bait product may be registered in California later this year.

* *Trademark of Dow AgroSciences*

Field Observations

Saponaria leaf spot

In a recent edition of CORF News, I reported the finding of a new leafspot disease found in the cut flower crop, Saponaria (*Saponaria vaccaria*). There were concerns that the fungus that caused the leafspot, *Alternaria saponariae* might also cause disease on other species in the carnation family (Caryophyllaceae) that have a greater economic importance. U.C. Cooperative Extension plant pathologist, Steve Koike, recently determined that the fungus isolates from Saponaria do not cause disease on carnation or sweet william (*Dianthus barbatus*). Alternaria diseases like most other foliar diseases can be controlled by proper sanitation, eliminating or reducing overhead irrigation, and fungicide applications before the disease occurs. Some possible fungicides in this case include chlorothalonil, mancozeb, and iprodione.

Tomato Spotted Wilt on Lisianthus

Although several viruses are capable of causing economic damage on Lisianthus (*Eustoma grandiflorum*), tomato spotted wilt virus is the most common in central coast greenhouses. A recent, disastrous, occurrence in a commercial crop of greenhouse-grown Lisianthus exhibited typical symptoms: plants had distorted, yellow terminal growth with necrotic (brown, dead) areas. Many leaves had slightly yellowed, rounded spots; this symptom is the hallmark of the disease. Western flower thrips were present on infected plants (they carry and transmit the virus to other plants.) Thrips damage can cause leaf necrosis and distortion alone. This damage can usually be distinguished from the disease because the disease also causes yellowing, usually more substantial necrosis, and the rounded spots. (See related article in this edition of CORF News)

Regional Report

Santa Cruz & Monterey Counties

Effects of Microbiological Soil Amendments and Plastic Tarp on the Control of *Fusarium* Wilt in Commercial Cut Carnations

Several microbiological soil amendments are commercially available and claim plant growth enhancement and/or control of various soil-inhabiting pathogens that cause root and vascular diseases. I hear mixed feedback from growers regarding the usefulness of these products: sometimes these amendments seem to enhance growth, sometimes they seem to control soil-borne disease. However, frequently growers are just not sure what the benefits really are when adding these soil amendments. The results depend on complex soil, microbiology, and plant characteristics and interactions, and therefore results often occur slowly and initially are not apparent with casual observation. One recommendation for growers when testing these products: leave some untreated plants so you can compare plant performance and disease incidence with treated plants.

The most beneficial role might be in reducing soil contamination that could result after soil has been steamed or fumigated. After these soils are sanitized, they can have a "biological vacuum" whereby plant pathogens might easily establish themselves. If beneficial organisms are quickly introduced into sanitized soils, then they can help combat the establishment of plant pathogens that might be inadvertently introduced later. At least, that's the theory.

With *Fusarium* wilt of carnation as the model experimental disease, various biological amendments have been tested in carnation production (J. MacDonald and S. Tjosvold, 1996-99). We hypothesized that effective control could be achieved by first properly steaming a raised production bed to eliminate *Fusarium oxysporum*, and second, establishing a soil population of beneficial microorganisms that could impede the re-introduction of the fungus. We tested some of the most commonly available commercial products, Soilgard (*Gliocladium*), Rootshield and Bio-Trek (*Trichoderma* species), and Promot (*Streptomyces*) in commercial cut carnation production. *Replicated experiments conducted over three years with these amendments have shown no reduction of Fusarium wilt.*

Our experiments have, however, shown great promise in a "low-tech" alternative technique to exclude the fungal pathogen from steam-sanitized, raised, production bed: a white polyethylene tarp covering the soil surface alone greatly reduces the incidence of *Fusarium* wilt. It is hypothesized that the plastic tarp is reducing the fungal contamination that results from *Fusarium*-contaminated dust settling on the production bed and the fungus moving into the root zone and infecting carnation plants. Carnations are planted through small perforations in the tarp and drip tape is laid under the tarp for irrigation.

Another interesting benefit with tarping the soil surface has been observed and documented in two experiments. Tarped carnation beds, come into production after planting more quickly than non-tarped beds. There are possibly several beneficial effects with tarping: 1) the tarp limits drying near the soil surface and therefore might create a larger optimum root-growth environment, 2) the white plastic reflects some extra sunlight back up to the plant, especially when it is young, and 3) the tarp is creating a more favorable temperature for root and shoot growth.

The California Cut Flower Commission and the Kee Kitayama Research Foundation have funded this research. A sincere thanks to the outstanding grower cooperators, Joe and Davis Onitsuka, Onitsuka Nursery, Salinas.

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Regional Report

San Diego County

Evaluation of UV-absorbing plastic films for insect control

Several clear polyethylene film products developed specifically for greenhouse use block high levels of ultraviolet light transmission while allowing transmission of visible light needed for photosynthesis. Dr. Heather Costa (Department of Entomology, UCR) and I have been evaluating the effect of UV absorbing plastics on insect migration into greenhouses.

The first studies used small experimental tunnels. Insects were released from a black box at the center of two tunnels and given a choice to enter a tunnel constructed of standard plastic, or a tunnel constructed of high UV-absorbing plastic. In these trials, 85-94% of released silverleaf whiteflies and 90-98% of released western flower thrips were trapped inside the standard tunnels. This indicated a distinct preference of both silverleaf whiteflies and western flower thrips to enter tunnels that transmit higher levels of UV light. These results suggested that greenhouse plastics might have significant influence on the initial attraction of insects into greenhouses.

Based on these results and discussions with manufacturers, three materials were selected for expanded field studies to gain maximum comparative information: 1) a standard (plastic blocks 360 nm UV and below), 2) a high UV-blocking plastic (blocks 380 nm UV and below) with insulator component, and 3) a standard plastic (blocks 360 nm UV and below) with the insulator component. This second standard was included because there was a question of whether the 'insulator' component of the plastics that retain infrared light waves was affecting insect behavior.

Each hoop house covered four beds of plants, with four rows of plants per bed. Two crops were planted in each house, two beds of chrysanthemum and two beds of solidago. Plants were transplanted in October 1998, and infested by naturally occurring populations of insects and pathogens. Insect populations are being monitored by four 3x5 inch yellow sticky cards, which are spaced through the length of each tunnel. Traps are collected counted and replaced weekly. Ten plants of each crop in each greenhouse are also sampled weekly and the number of insects recorded. Plants are also being monitored for incidence of fungal infection and virus symptoms.

We are still in the process of analyzing data from the first complete planting. However, it appears that trap counts for thrips and aphids are lower in UV-blocking houses, as was previously found in the small tunnel trials. There was no difference in the number of whiteflies trapped in the field trial. However, these were the greenhouse whitefly, not the silverleaf whitefly that were tested previously. Additional small tunnel trials will need to be completed to determine if greenhouse whitefly behaves similarly to silver leaf whitefly in small tunnel studies. In our next field experiment, in addition to a second crop of solidago, lisianthus will be planted for continued evaluation. We will report more on this project as the data is available.

Funding for this research has been provided by the Kee Kitayama Research Foundation, UC DANR Competitive Grants, the UC IPM Project and Mellano and Company.

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Field Observations

Red Imported Fire Ant Located in San Diego County

The Red Imported Fire Ant (RIFA) was discovered in San Marcos, in North San Diego County, in March. This is the first find of RIFA in San Diego County, although Department of Agriculture Inspectors have been on the lookout since it was found in Orange County last year. An eradication plan is being formulated by the San Diego County Department of Agriculture, Weights and Measures and the CDFA.

All of Orange County, as well as portions of Los Angeles and Riverside counties, are under quarantine for this pest. At this time, there are no plans for a quarantine in San Diego County.

RIFA sting and bite and have the most toxic venom of all the fire ant species. Ten to 20 stings per attack by each ant are common. They feed on germinating seeds and damage crops. In addition, they can cause damage to structures, electrical equipment, gardens and landscaping.

Southern California Declared Colonized with Africanized Honey Bees

Southern California, from parts of Ventura County south, has been declared colonized with AHB following the latest bee surveys. Typically the greatest number of annual stinging incidents occur in the first 3-4 years of becoming colonized. This is due in part to people learning how to adapt to living with AHB. The Fall 1998 issue of CORF News lists precautions for working in areas that are colonized with AHB.

No Recent Finds of Chrysanthemum White Rust

Now for the good news... Despite weather conducive to its development, there have been no new finds of chrysanthemum white rust in San Diego county!

Field Observations

Late Spring Rains and Cottony Rot

Sclerotinia rot, or cottony rot, primarily affects vegetables, but is a serious problem on a wide range of field flowers, including asters, carnations, chrysanthemums, cinerarias, dahlias, daisies, gerberas, snapdragons, stock, and strawflowers.

The fungus, *Sclerotinia sclerotiorum*, is favored by moisture and high humidity. With the late rains in northern California this year, warm weather will be an opportune time for cottony rot to attack plants because of warm soil and high humidity.

The fungus usually infects plants near the soil line, but can infect anywhere on the plant (flower petals and injured foliage). When high humidity, the fungus produces masses of cottony mycelia. Large black sclerotia are also formed, frequently inside of the plant stems. Plants killed by cottony rot often have a bleached appearance, and/or a basal stem rot. Symptoms can be similar to botrytis, so be sure to look for the black sclerotia in or on the stems (they look like small black mustard seeds). Plants may wilt and die quickly from this disease.

With warm soil temperatures in spring, fungal spores are released and are carried to plants by air currents. If the spores land on susceptible tissue when moisture is present, infection can occur. Commonly, though, infection occurs directly from sclerotia in the soil -- which is why it is important to prevent the fungus from establishing in the soil.

Prevention of cottony rot is important. Irrigate early in the day so that plants dry quickly. During wet weather, spray plants with vinclozolin (Vorlan), iprodione (Chipco 26019), or thiophanate-methyl (Cleary's 3336, Fungo, or SysTec) before rainy periods and at 2- to 4-week intervals during wet weather (as always, use pesticides according the label). Mancozeb can also be effective. Quintozene (Terraclor) will inhibit germination of sclerotia and can be quite effective, but it must be mixed well into the soil at planting time.

Remove contaminated plant debris from the field. If economical, contaminated fields can be fumigated. Avoid planting susceptible plants in infested fields.

Regional Report

San Mateo & San Francisco Counties

Horizontal Air Flow to Reduce Greenhouse Diseases

Ten years ago there was a surge in growers using "horizontal air flow" fans in their greenhouses to reduce foliar diseases and for better heat distribution. Most growers realized the success, at a low cost, and have continued to use simple propeller fans. Recently I met a couple of growers who were **not** using fans, and who were spending *a lot of money* on fungicides and heating because of their botrytis and other disease problems. One grower recently installed fans at my suggestion, and he has been very satisfied with the results (less disease, and less $$ spent on heating and fungicides!).

The cost for horizontal air flow (HAF) fans is low, they are simple to install, and they are cost-efficient to run. The concept is to use small circulating fans which push the air back and forth through the greenhouse in a circular pattern. Once air is in motion, it will continue to move through the greenhouse, with only a small amount of energy from a fan. The moving air will reduce humidity and "wet spots" in the foliage, and will distribute heat more uniformly.

Two of the real advantages with HAF fans are the reduction of humidity within the plant canopy, thereby reducing diseases because there is less moisture condensation on plants, and the uniform temperature distribution throughout the greenhouse. Carbon dioxide distribution is also more uniform with HAF.

Some growers are concerned about spreading pathogen spores with the fans, but the purpose of the fans is to create an environment in which the spores will not germinate. More disease problems tend to occur without adequate air movement in a greenhouse.

In a single greenhouse, the air should move down one side of the house and back up the other side with little mixing between the air streams. In connected greenhouses, the air should move down one house and back up through an adjacent one, creating a serpentine pattern through the connected houses.

The fans are operated 24 hours per day, so efficient fans should be used, with blades matched to the motor to prevent overloading. Efficient motors such as permanent split-capacitor motors should be used, along with large, high-pitch blades.

Fan placement is important. The energy should be directed toward the already moving air, and fans should be at least 10 to 15 feet from the end wall. They should be located half the distance across the house and should point directly down the house. Fans height should be from 6 to 10 feet from the floor, but at least 1 foot from the roof. The bottom of the fan should be placed at least 2 feet above the crop height (important in tall crops such as roses). Fans should also be placed where workers and their equipment will not bump into them.

The overall fan capacity should be 3 to 4 cubic feet per minute per square foot of floor area, with a velocity no greater than 198 feet per minute across the plants. This creates a gentle breeze, not a forceful wind.

Fans can be mounted with strapping, chain, or wire to suspend the fans from the greenhouse frame or truss. The fans should not swing when operating. After installation, the system can be checked with a smoke bomb to observe the air movement. The smoke should spread evenly across the greenhouse; the smoke should move at a speed of 50 to 100 feet per minute; and it should not short circuit to the other side before reaching the end wall.

For more information, contact me and I will send you a few useful articles on HAF fans. (Information presented here came from articles written by John Bartok from Univ. of Conn., and Michael Brugger from Ohio State Univ.).

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Regional Report

Ventura & Santa Barbara Counties

Urban Interface Problems

An explosion of urban interface related problems have besieged growers in both counties. After months of negative press about the agricultural industry, Lompoc growers are forming an organization to address ways of stimulating a more positive image in the community. The Santa Barbara Flower Growers Association is assessing its members a fee to support hiring a land use consultant and a public relations specialist, as a result of increasing pressure from political groups which recently culminated in a new County plan that may eventually significantly curtail greenhouse expansion. In Ventura County, the Agriculture Commissioner has come under fire by groups who feel his administration is too lenient on growers who have violated pesticide regulations. As a result, the media has once again come down hard on agriculture. Hopefully, The U.C. Hansen Trust, an endowment fund that has been used to develop many new programs to promote agriculture in Ventura County, will help to improve future community relations.

More Scouting Program Results

A 12-month scouting program was evaluated in a greenhouse where commercial breeding project crops included poinsettias, geraniums, impatiens, begonias, and numerous other potted color crops. The area initially was very difficult to monitor effectively because there were small groups of several plant species on each bench, which were continuously moved about. Infested plants were moved through the greenhouse, contaminating plants in other areas. "Pet" vegetable plants supported large populations of whiteflies. As a result of insecticidal resistance, the grower was spraying every week, and was not achieving adequate control.

One greenhouse was monitored each week. The visits included an intensive one-on-one training program conducted in Spanish by the UC scout who worked closely with the nursery pesticide applicator. The objective was to train the applicator so that he could scout the entire nursery. The greenhouse was divided into logical pest management units and the "pet" plants were moved out. Techniques for the use of sticky cards and visual inspection of plant samples were demonstrated. In addition, more effective pesticide applications were implemented by directed spray applications, focusing on areas in the canopy where pests reside. The use of pesticides in a rotation program was designed to reduce problems with resistance. Other techniques that were demonstrated at this site included biological control and the use of bio-pesticides.

Pesticide use reports and collected data were used to compare the 1998 pest management program (using monitoring data to base pest management actions) with a calendar-based program used in the previous year. A reduction of 58% over 1997 led to a 15% decrease in over-all pest management costs. This reduction in costs is probably even greater in reality, since many of the pesticides used in 1997 are no longer applied because they are no longer effective in this nursery. Many of the pesticides used in 1998 are newer products, and are considerably more expensive.

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Field Observations

Sharp-shooter Alert

The glassy-winged sharpshooter (GWSS) is a large leafhopper that has a wide host range, including many ornamentals such as eucalyptus, hibiscus, sunflower, philodendron, oleander, box wood, crape myrtle, oaks, sycamore, and birch. In addition to being a major nuisance (due to copious amounts of liquid excreted during feeding), sharpshooters are vectors of bacteria. When these bacteria are injected into the host they multiply, producing a xylem-plugging material which causes die-back and eventual plant collapse. In addition, some strains of bacteria cause plant diseases such as oleander leaf scorch. This disease may potentially wipe out one of the most important California landscape shrubs, as there is no cure for infected plants, and the disease is lethal. GWSS is therefore a potential serious pest of ornamental nurseries, and some growers report that they are no longer producing oleander as a result.

Phil Phillips, Area IPM Advisor in the Ventura County UCCE office, made the first recorded find of GWSS on eucalyptus in 1994. He has since been working on its biology and control, and has observed one effective native egg parasite, *Gonatocerus ashmeadi*. Parasite activity peaks in May, July, and again in early October when it can infect 80-95% of GWSS eggs. However, since adults live about 2 months, there may be ample numbers that over-winter to produce problems the following season, even with high parasitism rates. (Another predatory wasp has been found in San Diego County but only in limited areas). Other researchers at UC campuses are also working on the biology and control of sharpshooters (see Campus News, p.10).

Tospoviruses

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direction from which thrips enter the field or greenhouse. For instance, in field grown ranunculus, the greatest numbers of thrips were consistently caught on the north facing sticky traps and the first lesions were detected on petunias at trapping stations at the north end of the field. These observations directed our attention to the area north of the fields where a large block of TSWV infected, thrips infested malva was discovered. The grower quickly focussed on removing the malva from his field and from the surrounding areas to the north. Directing this control effort to a specific area made it feasible and the result was a dramatic decrease in spread of TSWV.

Growers often ask, 'Why monitor with indicator plants at all? Why not just spray the crop regularly or when thrips are found on sticky traps?' Routine spraying often causes pesticide resistance in thrips populations and seldom eliminates problems with INSV or TSWV. Sticky

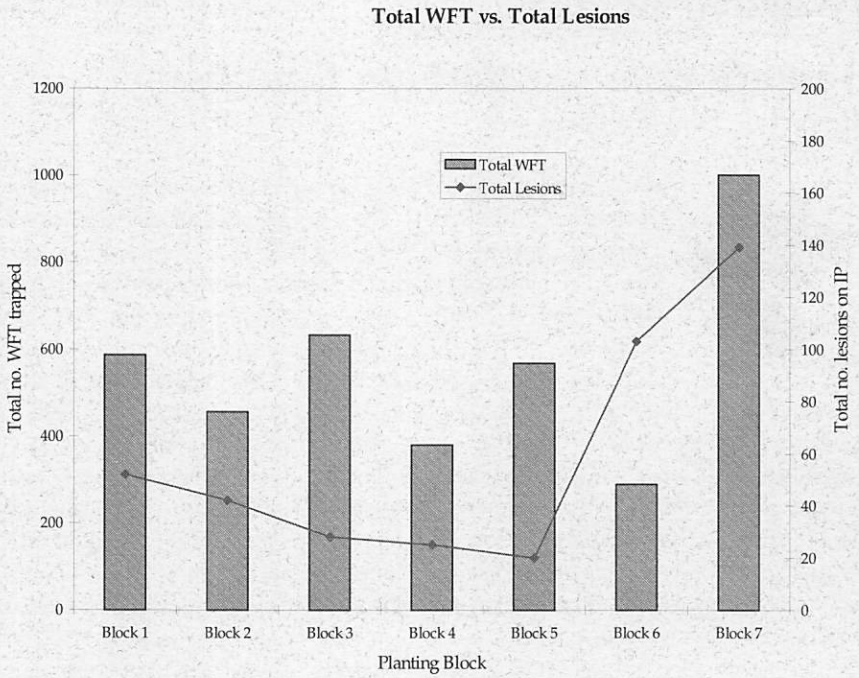

Figure 1. Comparison of average numbers of western flower thrips (the checkered bars) to the average number of lesions detected on petunia indicator plants (the black line) in each of seven production blocks monitored. Block 7 is the most northern block, block 1 is most southern.

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Tospoviruses

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trap counts alone do not necessarily reflect the number of infective thrips present, nor do they reveal their source. In our trials, there was no relationship between the average number of western flower thrips collected on sticky traps and the average number of lesions found on petunias (Figure 1). This is because only the infective thrips in the population can cause lesions and these are the only thrips important to virus spread. Since one thrips can infect several plants, it is not surprising that low levels of infective thrips can reflect a high level of virus. In our trials, lesions occurred most often in areas where the western flower thrips populations were relatively low (see Block 6 on Figure 1). Conversely, large numbers of western flower thrips have been observed where there were relatively few lesions (See blocks 3 and 5 on Figure 1). In field grown ranunculus, petunia lesions were more helpful in pinpointing sources of infective thrips than were sticky trap counts.

Use of the petunia indicator plant/directional trap system alerts the grower to the presence of infective thrips and helps locate their source. In our experience, removal of these sources greatly reduced virus incidence. For example, in our trials with field grown flowers, the number of infected plants dropped from more than 70% to less than 1% in one year.

For more information on the use of petunia indicator plants and for color pictures of representative lesions, please contact Karen Robb for a color brochure.

This research has been generously supported by the American Floral Endowment, the Carlsbad Agricultural Improvement Fund, donations from Mellano and Company, the Carlsbad Flower Fields, the University of California Integrated Pest Management Project, the Binational Agricultural Research and Development Fund, the California Department of Pesticide Regulation and the Hansen Trust.

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Campus News *Submitted by Julie Newman, Farm Advisor UCCE*

Campus-Wide Research Efforts to Curtail Sharpshooter-Spread Plant Diseases

The glassy-winged sharpshooter (GWSS)(*Homalodisca coagulata*) and the smoke tree sharpshooter (STSS) (*H. lacerta*) spread the plant pathogenic bacterium *Xylella fastidiosa*, which induces Pierce's disease of grapevine and a new disease known as oleander leaf scorch. GWSS, likely introduced from the southeastern U.S. before 1990 as eggs on nursery stock, can now be found in high populations throughout southern California. STSS, a native, is distributed mainly in dry areas from Riverside to the Coachella Valley. Thus far, these sharpshooters have had a substantial economic impact in affected areas by spreading plant diseases. Future additional impacts will depend on the spread of the GWSS throughout the state, and whether other disease-inducing strains of *X. fastidiosa* are introduced. Research to curtail the potential devastation of sharpshooter-spread plant diseases is currently being conducted at the University of California at Riverside, Davis, and Berkeley, and through Cooperative Extension. Since new strains of *X. fastidiosa* may likely be introduced into California in the future, leading to new diseases on other hosts plants, studies are underway to develop better detection techniques; methods of reducing vector pressure in affected areas are also being evaluated. Efforts will concentrate on providing short-term strategies, e.g. the use of systemic insecticides, to slow the spread of these diseases while long-term solutions are developed.

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Cal Poly, SLO Hosts IPM Conference

The Environmental Horticulture Integrated Pest Management Conference will be held on June 14 and 15, 1999 at Cal Poly, San Luis Obispo. The conference is designed to provide growers, pest control advisors, pesticide applicators and others in the ornamentals industry with current information on pest management. This year's conference features regulatory updates, and a symposium on root disorders. Hands-on break out groups will explore the use of simple instrumentation to aid in diagnosis of disorders as well as biocontrols, weed control, abiotic disorders, and worker safety training. PCAs and applicators can earn 18.5 continuing education credits and credits are available for certified crop advisors. The cost is $175 including lunch both days. For information contact Dr. Robert Rice, Environmental Horticultural Science Dept., Cal Poly, San Luis Obispo, CA 93407, Phone: 805 756 2830, FAX 756 2869, e-mail: rrice@calpoly.edu

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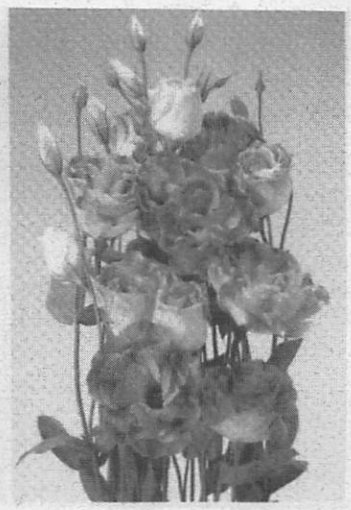

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Sting Nematode Project at UC Riverside

The sting nematode, *Belonolaimus longicaudatus* is one of the most economically devastating plant parasitic nematodes in the US because of its wide host range and severe damage potential even at low population levels. It is widely distributed in the southeastern states and attacks almost any ornamental plant. In recent years it has been discovered in the Coachella Valley and is well suited to reproduce and spread throughout southern California. They threaten to become a major problem for horticultural industries since several nematicides that once controlled these pests are no longer available. Although sting nematodes were first discovered more than 50 years ago, little is known about their life cycle and behavior. We recently succeeded in culturing this nematode on a nutrient medium that supports the growth of plant roots. The nematodes are monitored under a microscope throughout their life cycle. The intent of this project is to obtain detailed information about feeding, mating, reproduction and survival behavior. This information will be essential to develop new pest management strategies.

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Calendar
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morning session will conclude with a discussion of how to implement control programs for multiple pests on a single crop, i.e. "how to get the most bang for your buck". Lunch will include a mini-trade fair. The afternoon presentations will focus on new registered pesticides and those coming down the pipe with discussions by chemical company representatives on how to best use their products. Six PCA CE hours pending approval. 9AM - 4 PM. Lunch is not guaranteed for late registration. SAN DIEGO: May 27

Postharvest Treatments for Floral Crops

These hands-on workshops will focus on three very vital areas of successful postharvest handling; sanitation, using preservatives effectively, and temperature effects on postharvest quality. The workshop will be conducted in Spanish as well as English, with UC researchers and representatives from Floralife demonstrating how to extend floral product life. English sessions; 8 AM - 12 PM Spanish sessions; 12:30 - 4:30 PM PCA CE hours pending approval. SALINAS: October 19, CARPINTERIA: October 20, SAN DIEGO: October 21, HALF MOON BAY (English only): October 28

Grower Tour to Oregon & the FarWest Show

The Farwest Show in Portland, Oregon is North America's highest attended nursery and greenhouse industry trade show. Sample an array of Oregon's finest nurseries, from bulbs and cut flowers, to potted plants, to specialty annuals, perennials and woody plants, on our guided tour on August 25-26. Then visit the exciting tradeshow, August 27-29, which attracted nearly 15,000 participants last year. Please note that we will start our tour a day earlier than originally advertised so that you will have the option of also attending the **Ornamentals Northwest Seminars** starting at 2 PM on Aug 26. These seminars will feature Dr. Allan Armitage, international expert on specialty cut flowers. There will be a number of presentations related to specialty crops, including an expedition to China for new varieties. Watch for more details in the next issue of CORF News. August 25 - August 27. Cost: TBA

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