

Final Report on Research Funded by the California Cut Flower Commission

Title: Development and Implementation of IPM Strategies for Western Flower Thrips

Principal Investigators:

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Cooperators:

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Dr. Karen L. Robb, Floriculture Farm Advisor, Cooperative Extension, Building 4, 5555 Overland Ave., San Diego, CA 92023, (619) 694-2840.

Mr. Steve Tjosvold, Environmental Horticulture Farm Advisor, Cooperative Extension, 1432 Freedom Blvd., Watsonville, CA, 95076-2796, (408) 425-2591.

Objectives:

- 1) Survey natural enemies of western flower thrips (WFT) indigenous to California.
- 2) Evaluate relationships between host plants, WFT densities, and natural enemy populations for three flower-growing regions of California.

B. Procedures:

1) Survey natural enemies of WFT endemic to California ornamentals.

Rationale: A central tenet of biological control is that the best natural enemies of a particular pest are located near the pest's evolutionary center-of-origin. WFT (*Frankliniella occidentalis*) was originally identified as *Euthrips occidentalis* from specimens attacking apricots, oranges and potatoes in California. In addition, WFT is the most common species of thrips in California. These lines of evidence suggest that the evolutionary center-of-origin of WFT may be in California and hence, it is

likely that the most effective natural enemies against WFT are also located in California. To discover these natural enemies, we will conduct a survey of the natural enemy fauna attacking WFT in three major cut-flower commodities; carnations, chrysanthemums and roses.

Procedures: The three major cut flower-producing areas of California (San Diego, Santa Barbara, and Monterey counties) were sampled in November 1993 and in March, June and October 1994. Within each county, samples were collected from two greenhouse and two field rose, chrysanthemum and carnation operations according to their availability. A sample consisted of 10 flower buds with flower color just starting to show between the sepals. No more than 5 cultivars from each species were sampled from each operation and an effort was made to keep plant cultivars consistent across sampling localities. Samples collected in the field were stored in 50% alcohol for transport to the laboratory at UC Davis. All of the arthropods were extracted from the flower buds and stored in saline solution at 36° F. WFT were dissected to detect the presence of nematodes and internal parasitoids, and all natural enemies were identified to species.

Results: Samples from four collections obtained every three months during November 1993 through October 1994 are summarized in Figure 1 and Table 1. The survey data indicate that greenhouse- and field-grown chrysanthemums support very low populations of WFT and their natural enemies. In addition, populations are lower in San Diego County than either Santa Barbara or Monterey counties. By contrast, populations of WFT and their natural enemies were the highest in greenhouse-grown carnations in Santa Barbara county and in field-grown roses in Monterey county. The dominant natural enemies were the parasitic nematode, *Thripinema aptini* and two predators, *Orius* sp. (minute pirate bug) and *Amblyseius* sp. (a predatory mite).

Densities of WFT vary substantially among location, flower color/cultivar within each crop and the densities of WFT natural enemies covary with WFT densities and flower colors (See figure and table below). Additional research will be needed to determine to which of these two factors natural enemies are most responsive.

Figure 1. Densities of WFT and their natural enemies by sampling location and crop.

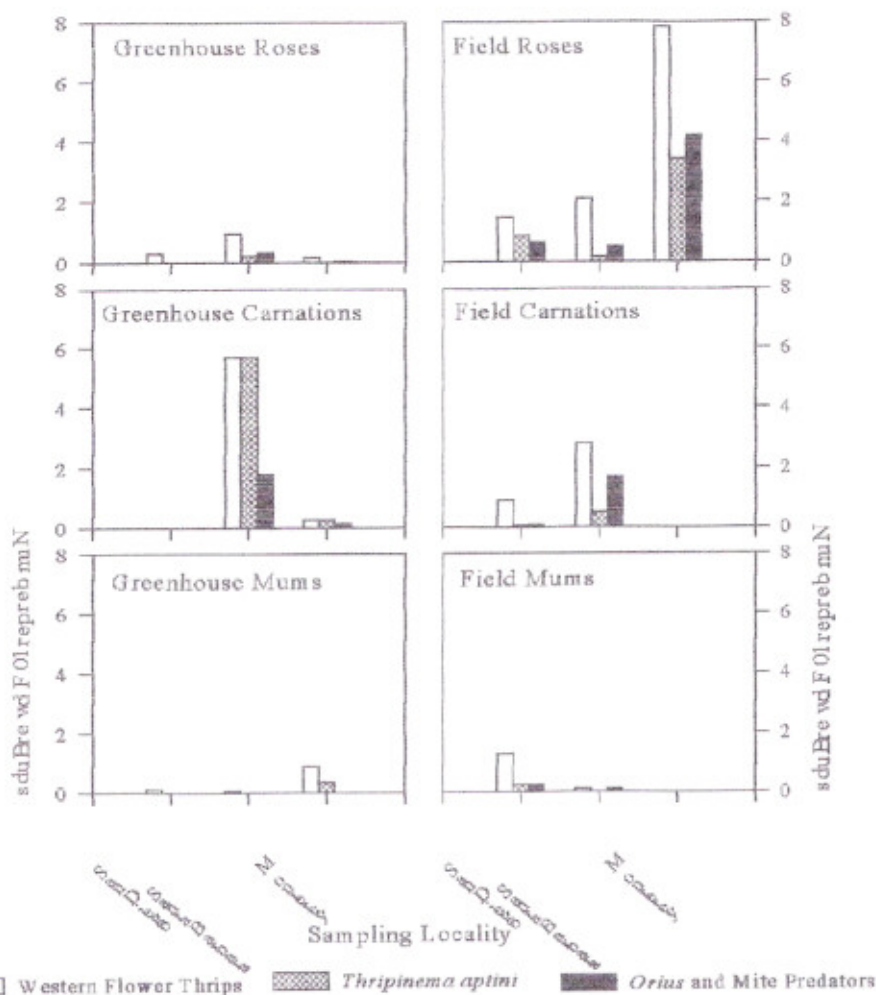


Table 1. Densities of WFT and their natural enemies by crop, flower color, and cultivar.

Flower Color	Cultivars	WFT / 10 Flower Buds	<i>T. aptini</i> / 10 Flower Buds	<i>Orius</i> & Mite Predators / 10 Flower Buds
----- Roses -----				
White	Bridal, Lady Liberty, Moonlight, Tmca	2.06	0.31	0.81
Sonia	Sonia	1.29	0.14	0.57
Yellow	Emblem, Golden Nugget	1.23	0.69	0.38
Red	Dahlia, Dallas, Kardinal, Priva, Royalty	1.13	0.26	0.39
Pink	Bridal, Diadem, Raspberry, Vivalde	0.81	0.48	0.43
----- Carnations -----				
Violet	Exquisite, Matzro, Vanessa	3.42	0.75	0.75
Yellow	Candy, Citron Ella, Dallas, Lemon Twist, Lovely Girl, Pallage	2.54	0.38	1.38
Pink	Candy, Nora, Smoke	1.57	0.14	0.79
White	Atlantis, Bagatel, White Leana, Improved	1.25	0.25	0.75
Red	Scandia, Sombiha	0.73	0.18	0.36
----- Chrysanthemums -----				
White	Polaris, Reagan, Shoesmith	0.8	0.2	0.67
Yellow	Modc, Plaris, Reagan, Shoesmith, Stingray	0.75	0.25	0.38
Red	Foxy, Reagan, Stingray	0.25	0	0
Bronze	Escapade, Navajo, Reagan, Stingray	0.25	0	0
Violet	Hurles Kism, Improved Reagan, Reagan, Royal	0.07	0.07	0.07



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August 29, 1995

Dr. Kevin M. Heinz
Biological Control Laboratory
Department of Entomology
Texas A & M University
College Station, TX 77843-2475

RE: Your 1994 research project entitled *Development and Implementation of IPM Strategies for Western Flower Thrips*

Dear Dr. Heinz:

We are completing our booklet of research progress reports and final reports for 1994 to be made available to our growers who funded these projects. Yours is missing. Please send a three or four page **final report** *in layman's terms* to our office by **Tuesday, September 12, 1995**.

I must inform you that due to the difficulties we have had in getting progress reports and final reports in a timely manner, the CCFC Research Committee has determined that researchers who fail to comply will lose their opportunity to obtain future funding from the CCFC for their projects.

I hope to hear from you soon.

Sincerely,

A handwritten signature in cursive script that reads 'Lynne Dory'.

Lynne A. Dory
Administrative Assistant

cc: Steve Siri and Mark Yamaguchi, Co-Chairs, CCFC Research Committee



American
Floral
Endowment

UPDATE

March, 1994

American Floral Endowment Board Announces Over \$480,000 in Annual Funding

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During their January funding meeting, the American Floral Endowment board of trustees awarded almost one-half million dollars to fund research and education vital to the floral industry.

Funding decisions were based on the Projects and Grants Committee's recommendations. Targeting industry priorities and ensuring effective use of funds are key Endowment funding objectives.

As always, the board benefitted from a wide range of input in arriving at the funding allocation. All projects are reviewed and evaluated by the Society of American Florists' Research Committee. Each project is also critiqued by members of the academic community as well as other members of the floral industry.

In addition, Carl Scharfenberg, who monitors all Endowment projects as a special advisor to the board, provided analysis and recommendations on all current and proposed projects.

With the development of the team approach in Pest Management and Post-Production Studies, team leaders Dr. Michael Parrella and Dr. Terril Nell evaluated and made recommendations in their respective areas. Funding for 1994/95 totals \$480,751.00. As this year's funding is announced, the Endowment will have allocated

over \$5 million dollars to research and education since 1961. Specific projects awarded funding this year are identified by research area and detailed as follows:

BREEDING

Breeding Pelargonium for Resistance to Botrytis Blight, (3rd Year), Pennsylvania State University, Dr. Richard Craig, \$10,000.

Using DNA Amplification Fingerprinting (DAF) to Determine Parentage of Petunia Hybrida Cultivars, University of Tennessee, Dr. Terri Starman, \$5,000.

PEST MANAGEMENT

Control of Tomato Spotted Wilt Virus Using Transgenic Plants that Produce Virus-Specific Monoclonal Antibodies, (4th Year), University of Hawaii, Dr. John S. Hu, \$25,000.

Development of Resistance to Tomato Spotted Wilt and Other Similar Viruses in Floral Crops, (3rd Year), North Carolina State University, Dr. James Moyer, \$15,000.

Integrating Control of Botrytis and Powdery Mildew in a Greenhouse Crop, Michigan State University, (2nd Year), Dr. Mary Hausbeck, \$20,000.

Insecticidal Controlled Atmosphere for Management of Sweetpotato Whitefly, (2nd Year), University of Massachusetts, Dr. Susan Han, \$14,174.

Efficient Release Strategies for Aphid Natural Enemies in Flower Crops, Texas A&M University, Dr. Kevin Heinz, \$30,000.

Management of Thrips and Whiteflies with Insect-Killing Fungi: Greenhouse Spray Trials, University of Vermont, Dr. Michael Brownbridge, \$10,000.

Development of IPM Strategies for Floricultural Crops, (8th Year), University of California, Davis, Dr. Michael Parrella, \$40,000.

POST PRODUCTION STUDIES

Increasing Flowering Potted Plant Longevity, (2nd Year), University of Florida, Dr. Terril Nell, \$15,000.

Leaf Yellowing in Easter Lilies: Causes and Solutions, (3rd Year), Clemson University & Purdue University, Dr. William Miller and Dr. P. Allen Hammer, \$15,000.

Post-Greenhouse Evaluations of Forced Bulbous Plants, (7th Year), North Carolina State University and University of Florida, Dr. August DeHertogh and Dr. Terril Nell, \$12,000.



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June 29, 1994

Lynne Dory
Administrative Assistant
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RECEIVED
JUN 30 1994
CCFC

Dear Ms. Dory:

Enclosed is report of my progress on our research project titled, "Development and Implementation of IPM Strategies for Western Flower Thrips."

If you have any questions, please do not hesitate to call me.

Sincerely,

A handwritten signature in blue ink, appearing to read "Kevin M. Heinz".

Kevin M. Heinz

Enclosures: 1 copy of progress report