Cooperative Extension • Monterey County

Crop Notes

September/October, 2006

In This Issue:

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BILL CHANEY RETIRING

Entomology Farm Advisor Bill Chaney is retiring, and will leave the Salinas area this December. Bill was hired in June of 1987, and has been an invaluable member of the Cooperative Extension staff. He is highly respected by his clientele, who enjoy his straightforward, and often humorous presentations, and who rely on his excellent knowledge and responsive customer service. Bill, as a person, cannot be replaced, but County Director Hammond is seeking authorization for funding to refill the position.

CAPCA Sponsors Retirement Luncheon -
CAPCA is sponsoring a retirement luncheon for Bill at 12:30 p.m. immediately following Bill's final annual Entomology Workshop on Thursday, December 7. CAPCA is hosting the event, but a reservation is required. To reserve a place, call Cooperative Extension and speak to June: 759-7352, or email your reservation to jrasmussen@ucdavis.edu.

TESTING THE EFFICACY OF SUCCESS (SPINOSAD) INSECTICIDE IN MANAGEMENT OF WESTERN FLOWER THRIPS, *FRANKLINIELLA OCCIDENTALIS*, IN STRAWBERRY

Mark Bolda, Farm Advisor
Santa Cruz, Monterey and San Benito Counties

Introduction: The Western flowers thrips, *Frankliniella occidentalis*, is a persistent pest in strawberries, causing Type I fruit bronzing and premature drying of stigma and anthers of flowers.

While controlled by a wide variety of predators such as minute pirate bugs (*Orius* spp.), Western flower thrips are occasionally best controlled with insecticides. Over the past several years, Success (spinosad) and its organically registered counterpart, Entrust, have been used by growers to chemically manage this pest. However, over the past season, there have been reports of a lack of efficacy when using Success for control of thrips in strawberries.

The following trial was conducted to confirm the efficacy of Success in controlling thrips in strawberry in combination with the tank adjuvants Silwet L-77 and Prevam, and also in comparison with the organically registered counterpart Entrust.

Materials and Methods: The insecticide trial was done as a single four 8 foot long by 4 foot wide plot per treatment on PS592 variety strawberry infested with a large population of Western flowers thrips. Randomization was achieved within each plot in the evaluation (see below).

Application: A single application of all materials was made on August 25, 2006. Experimental applications were made at the rate of water carrier of 112 gallons per acre. Applications were made with a standard tractor mounted boom sprayer with drop nozzles in each strawberry row.
For each mix, after mixing the test chemical with water, pH was taken using Hydrion pH paper.

Refer to the table below for list of treatments:

Number	Treatment	Rate per acre
1.	Untreated Control	-
2.	Success + Silwet L-77	6 oz + 0.1% v/v
3	Success + Prevam	6 oz + 0.8%
4.	Entrust + Silwet L-77	1.5 oz + 0.1%

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WEED MANAGEMENT FOR ORGANIC VEGETABLE PRODUCTION ON 80-INCH BEDS

Richard Smith, Steve Fennimore and Eric Brennan, Farm Advisor, Extension Vegetable Weed Specialist, University of California Cooperative Extension and Organic Vegetable Production Scientist, USDA, Salinas

Acreage of organic vegetable production continues to increase in the Central Coast production district and weed control in vegetables grown on 80 inch beds presents a great challenge for organic producers. This is particularly true of high density stands (i.e. 24 to 32 seedlines per bed) such as spring mix and spinach where interrow cultivation is not possible. Normally, 80% of the bed can be cultivated on double row 40 inch beds, however only 20% of the area (furrow and sides of beds) can be cultivated in densely cropped 80 inch beds. Given the use of mechanical harvest and the demand for a weed free harvested product, means that practices other than cultivation must be used to control weeds. In this article we will discuss the biology of key weeds, as well as organically acceptable weed control techniques.

WEED BIOLOGY

The first step in managing weeds is to understand as much as possible of the biology of the problem weeds. In the Central Coast area we have unique summer microclimates that range from cool (i.e. Castroville) to warm (i.e. King City, Hollister, Gilroy), and the weeds that grow in these areas differ. For instance, in the coastal areas, cool season weeds such as chickweed, shepherds purse and burning nettle continue to emerge all year. Whereas in warm areas, there is greater seasonal variation in the weed spectrum. Warm season weeds such as common purslane and hairy nightshade predominate in the summer, and cool season weeds usually only emerge in the winter. In intermediate areas both cool and warm season weeds may be present in the summer months. The overall goal of a good weed management program is to prevent or minimize weed seed production and addition to the soil. In intensive vegetable production areas, the most common weeds are those that have strategies for setting enough seed to persist in spite of quick rotations and intensive cultivation. Figure 1 shows the fates of weed seed in the soil. It should be noted that for most weed species, the majority of the seed in the seedbank is dormant and only a small percentage is able to germinate at a given time. Of the seed that is ready to germinate only a percentage is close enough to the soil surface (i.e. < 1 inch) to germinate. This is an important concept that can be taken advantage of in the cultural weed control strategies discussed below.

Another important weed biology issue is the strategy that the weed species uses to set seed. Some weed species such as burning nettle and purslane rely upon setting seed quickly. These weeds are particularly challenging to control because they can set seed within one month of germination. Other species such as malva, do not set seed quickly, but have seed that is long-lived in the soil seedbank (i.e. 10 – 20 years). In addition, there are some species such as groundsel that are short-lived in the soil seed bank, and depend upon constant invasion by seed that are aerially dispersed from either inside the field or from surrounding areas.

WEED MANAGEMENT PRIOR TO PLANTING THE CROP

Field selection and planting date: Having knowledge of which fields are weedy and avoiding the may be the best way to save money on weeding costs in high density 80 inch bed production. In addition, planting date can also be used to avoid some weed problems. For instance, purslane requires warm soil temperatures (> 60º F) and is therefore principally a problem from late spring to fall (see Figure 2). In this case, early spring plantings of high density plantings can avoid problems with this weed, whereas summer planting (i.e June to August) will hit the peak of purslane emergence and be expensive to weed (see Figure 3).

Winter weed control: Winter weed control can be the Achille's heal of a good weed control program. This is particularly true in organic production where fallow bed weed control is limited to mechanical control which is limited by weather and wet soil conditions. We have measured millions of seeds per acre being produced on fallow beds in wet winters where growers were not able to lilliston in a timely manner. These cool seaons weeds growing on the fallow beds (i.e. shepherds purse, burning nettle, groundsel and others) will germinate the following summer in most parts of Central Coast region. Winter-grown crops can also be problematic because they can harbor weeds that then produce seed and contribute to the seedbank. This is frequently observed in winter broccoli where weeds such as malva, nettle and shepherds purse escape weed control and set large amounts of seed.

Pre-germination of Weeds – prior to bed shaping: Pre-germination involves the use of irrigation or rain to stimulate weed seed germination prior to planting the crop. This technique reduces the number of weed

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High density stands (i.e. 24/32 seedlines per bed on 80-inch beds) do not allow for inter-row cultivation.

Given the use of mechanical harvest and the demand for a weed free harvested product, means that practices other than cultivation must be used to control weeds.

The first step in managing weeds is to understand as much as possible of the biology of the problem weeds.

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In a two year study conducted in Salinas, preirrigating with sprinkler or furrow irrigation and waiting 7 to 14 days to control emerged weeds with shallow tillage reduced the densities of the weeds in the subsequent lettuce crop by 33 to 65% and reduced weeding time

seed that is ready to germinate in the shallow surface layers. The emerged seedlings can then be killed by shallow cultivation. Pre-germination should be done as close as possible to the date of planting to assure that the weed spectrum does not change prior to planting the vegetable crop. The time of year, irrigation system and the interval between irrigation and weed control all affect the efficacy of this technique. In a two year study conducted in Salinas, preirrigating with sprinkler or furrow irrigation and waiting 7 to 14 days to control emerged weeds with shallow tillage reduced the densities of the weeds in the subsequent lettuce crop by 33 to 65% and reduced weeding time (see Table 1). If time permits, pre-germination can be repeated to further reduce weed populations.

Pre-germination of weeds – following bed shaping: Once beds are shaped and ready to plant, pregermination water can be used to stimulate a flush of weeds. In this case, weeds close to the soil surface are stimulated to germinate and then killed, thereby depleting the quantity of weed seed in the surface layer of soil of the shaped bed. The flush of weeds can be killed with shallow cultivation, flaming or applications of organic herbicides. This technique is called "stale" seedbed weed control. The crop can then be planted immediately and the amount of weed control can be substantial.

Cover crops are a key cultural practice in organic production and provide a variety of benefits to crop production. However, cover crops have the potential to increase weed pressure in vegetable production systems by allowing weed seed production in the cover crop production cycle.

Herbicides: All of the organic herbicides are non-selective contact materials that contain various essential oils and/or acetic acid. Their best use is as a burn down treatment of weeds, and have particulary utility for use in general field sanitation. These materials are most effective on small broadleaf weeds (i.e., < 1-2 true leaves) and their efficacy depends on application rate. Grass weeds and some broadleaf weeds are difficult to control with these products at any size.

Cover crops: Cover crops are a key cultural practice in organic production and provide a variety of benefits to crop production. However, cover crops have the potential to increase weed pressure in vegetable production systems by allowing weed seed production in the cover crop production cycle. Often weed plants decompose before the end of the cover crop cycle so that you might not ever notice weeds in the cover crop. Slow growing winter cover crops can be particularly problematic for aggravating weed problems. For instance, many legumes and cereal/legume mixes at normal seeding rates (i.e. 100-120 lbs/A) allow substantial weed growth and seed set early in the growth cycle of the cover crop (see Table 2). Cover crops that complete with weeds provide complete ground cover in the first 30 days of growth. Adequate seeding rate is also an important factor in providing for rapid ground cover. Competitive cover crops varieties include Merced rye, white mustard (*Sinapis alba*), Indian mustard (*Brassica juncea*), and legume/cereal mixtures at higher seeding rates (i.e. 200lb/acre). It is important to monitor your cover crops, particularly in the first 40 days following seeding to make sure that they are not creating a weed problem. Tools such as the rotary hoe can be used to cultivate weeds in cover crops. Rotary hoeing reduced weed seed production by chickweed and shepherd's purse 80 to 95% in a legume/cereal cover crop during a two year study in Salinas.

Cover crops that complete with weeds provide complete ground cover in the first 30 days of growth.

Weed removal and weed control in surrounding areas: Physically removing weeds during weeding operations and carrying them to the edge of the fields for disposal is an important and much used practice to reduce additions of weed seed to the seed bank. This technique can be used to "clean up" a weedy field as well as to maintain low weed populations. It is important to remove large weeds around valves, telephone poles, etc in fields that can serve as a source of large amounts of weed seed that are eventually spread to the rest of the field. It is also important to control weeds in areas surrounding fields. This is particularly true for weeds with windblown seed such as groundsel, sow thistle and marestail.

Crop rotation: Short crop rotations with spring mix and spinach provide an opportunity to allow the germination of many weeds which are then unable to complete their lifecycle and set seed in the field. This can be particularly helpful for weeds like malva which are slow to flower and can help to deplete their seed bank. However, care should be taken if these crops are allowed to regrow to not allow established weeds, not controlled by other means, to regrow and set seed.

Impact of organic matter: In organic production efforts are made to increase the levels of organic matter to improve soil properties and fertility. There are some indications that additions of organic matter from cover crops and compost can reduce weed pressure. A two year study in the Salinas Valley showed that weed pressure in cover cropped and composted plots were less than plots where no cover crop or compost was added. It is unclear why organic matter may reduce weed emergence, but it is probably due to increased weed seed degradation by soil microbes.

Biofumigation: Mustard cover crops release short-lived toxic chemicals (biofumigation) to the soil that can reduce weed pressure. In a two years study we observed weed pressure reduced by nearly half on a weedy site,

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but on low weed pressure sites it has been more difficult to observe and measure this effect.

Deep plowing: Deep plowing can bury weed seed or propagules of perennial plants below the depth at which they can germinate. The viability of buried weed seed declines over time and longer intervals between deep plowing and subsequent deep plowing (i.e. 3-5 years) is preferred in order to avoid bringing up viable weed seed back to the soil surface.

Soil Solarization: Soil solarization can significantly reduce viable weed seed in the top layer of the soil. Soil solarization traps the sun's energy beneath a layer of clear plastic, increasing the temperature in the top layer of soil to lethal levels so that the seed and seedlings of many weed species are killed. There is a great deal of information on the techniques to achieve effective soil solarization. This technique is used successfully for organic carrot production in the desert and Central Valley regions but its use has been limited on the coast. In this area, the plastic must be applied when there is less chance of fog (i.e. August and September). Solarization has been shown to reduce weed pressure in this area, but the economics must be carefully examined before using this technique.

WEED MANAGEMENT AFTER PLANTING THE CROP

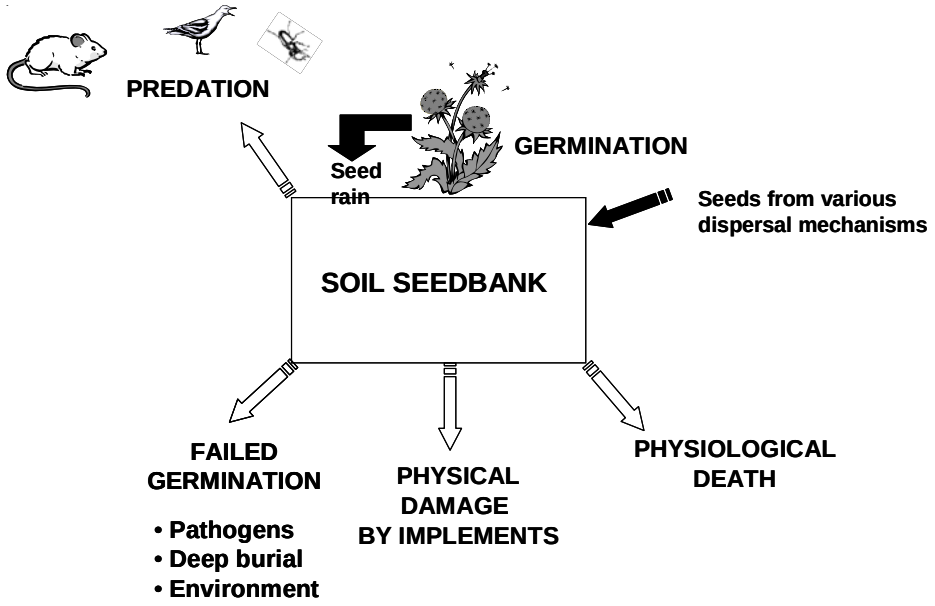
Cultivation: Cultivation is one of the most effective post planting cultural practices. On three to six seedline 80 inch production systems cultivation is used effectively. However as was mentioned above, on densely planted 80 inch beds cultivation is limited to the furrows. The goal of cultivation is to cut weed seedlings as close to the seed row as possible without disturbing the crop. New precision guidance systems for cultivation (i.e. EcoDan®) can help improve the accuracy of cultivation operations. More precise cultivation allows for reducing the width of the uncultivated band and thereby removing a higher percentage of the weeds. For instance in studies underway, by reducing the uncultivated band width from 4 to 2 inches, 50% more weeds were removed and weeding time was reduced accordingly.

Preemergence Flaming: Flaming can also be used to control a flush of weeds that emerge before the crop emerges. This is most effective in crops such as cilantro, parsley, peppers, parsnips and others that emerge more slowly than many weeds.

Hand weeding: Hand hoeing is generally necessary in organic 80 inch bed production. Hoeing is made difficult due to the close plant spacing and the multiple seedlines per bed. Successful employment of the above mentioned techniques can help make hand weeding operations less tedious and more efficient.

Summary: Despite our best efforts, organic weed control is very difficult. These suggestions are a long-term approach reducing the risk of high weed infestations. Diligent and successful employment of the above mentioned techniques can over time reduce weed pressure to toleratble levels in organic fields and specifically on 80 inch beds.

Figure 1. Fates of weed seed in the soil seedbank



Physically removing weeds during weeding operations and carrying them to the edge of the fields for disposal is an important and much used practice to reduce additions of weed seed to the seed bank.

Short crop rotations with spring mix and spinach provide an opportunity to allow the germination of many weeds which are then unable to complete their lifecycle and set seed in the field.

. . .organic matter may reduce weed emergence, but it is probably due to increased weed seed degradation by soil microbes.

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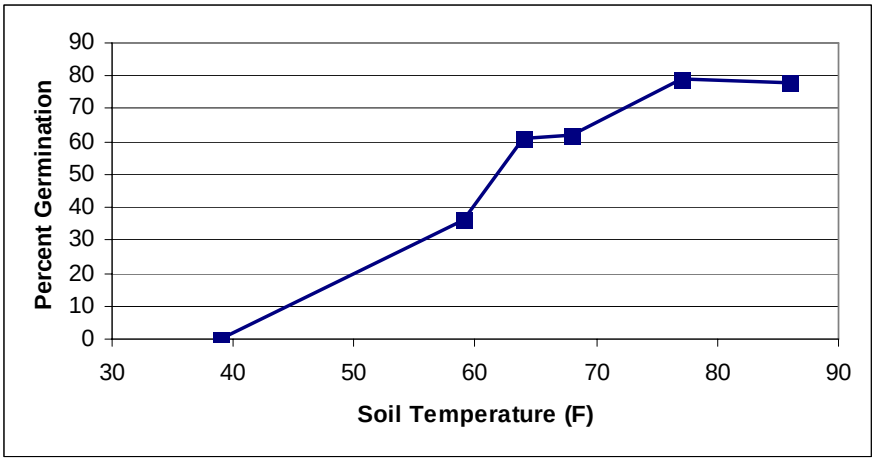
Solarization has been shown to reduce weed pressure in this area, but the economics must be carefully examined before using this technique.

Cultivation is one of the most effective post planting cultural practices.

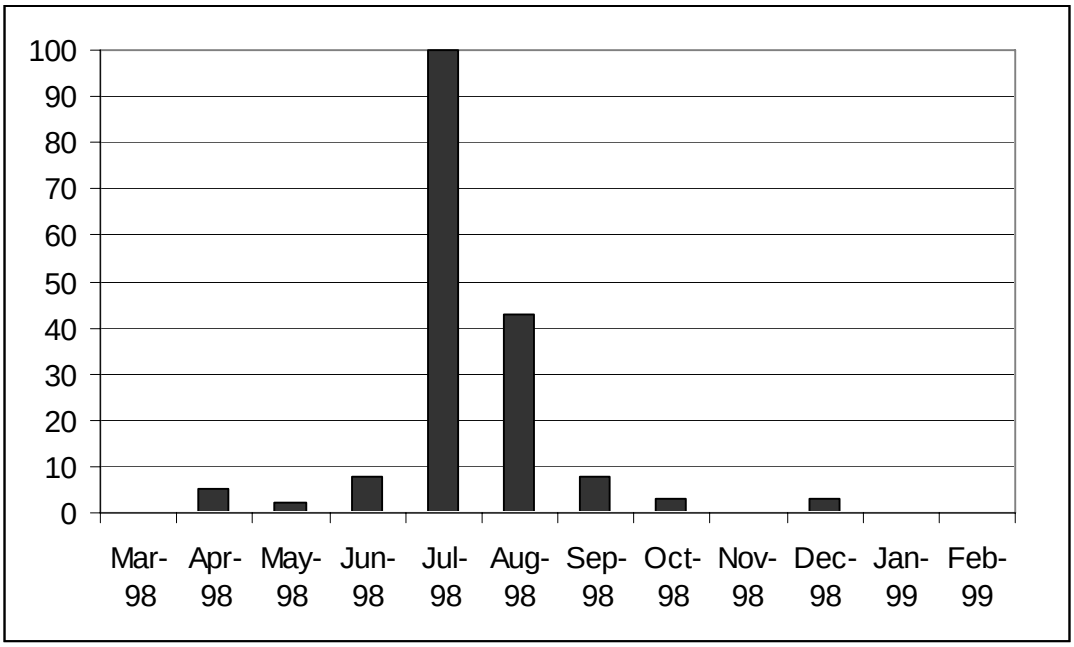
New precision guidance systems for cultivation (i.e. EcoDan®) can help improve the accuracy of cultivation operations.

Figure 2. Percent germination of purslane seed at various temperatures



(Summarized from Vengris, Dunn and Stacewicz-Sapuncakis, 1972)

Figure 3. Purslane germination at two sites in the Salinas Valley as a percentage of the month with the maximum germination (i.e. month with maximum emergence was 100%)



(Fennimore et al. 2000).

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Table 1. Effect of preirrigation on weeds in subsequent 2003 lettuce crop and hoeing time of weeds in lettuce (2002 results were similar)

Preplant Irrigation Treatment	Spring lettuce		Fall lettuce	
	Weed density	Weeding time	Weed density	Weeding time
	Number per square meter	Hours per acre	Number per square meter	Hours per acre
No Preirrigation	278 a	13.9 a	141 a	12.8 a
Furrow Irrigation	186 b	12.3 b	63 b	10.5 b
Sprinkler Irrigation	147 b	10.5 c	49 b	10.2 b

(Shem-Tov, Fennimore and Lanini, in press)

Hand hoeing is generally necessary in organic 80 inch bed production. Hoeing is made difficult due to the close plant spacing and the multiple seedlines per bed.

Table 2. Ground cover by cover crops, and seed production of burning nettle in cover crops.

Cover Crop	Percent ground cover 28 days after planting	Burning nettle seed production	
		Year 1	Year 2
		Viable seeds per square meter	
Legume/oats	18 a	13,622 a	4,282 a
Mustard Blend	78 c	1,283 b	14 c
Cayuse Oats	30 a	6,010 a	1,861 a
Merced Rye	46 b	----	275 b

(Brennan and Smith, 2005)

. . .over time reduce weed pressure to toleratble levels in organic fields and specifically on 80 inch beds.

University of California Cooperative Extension
Monterey County

2006 Plant Disease Seminar

Tuesday, November 14, 2006
8:00 a.m. to 12:00 p.m.

Monterey County Agricultural Center
Richard W. Nutter Conference Room
1432 Abbott Street, Salinas, CA

This seminar will cover a wide range of disease and research topics for vegetable, ornamental, and coastal fruit crops.

Speakers to be announced.

Continuing education credits will be requested. For more information, contact Steven Koike (831-759-7350; 1432 Abbott Street, Salinas, California 93901).

Afternoon session will be hosted by CAPCA, Monterey Bay Chapter.

ANNUAL ENTOMOLOGY SEMINAR

Thursday, December 7, 2006
8:30 a.m. to 12:00 p.m.
Monterey County Agricultural Center
Richard W. Nutter Conference Room
1432 Abbott Street, Salinas, California

This seminar will cover a research conducted within the past year regarding insect management for the central coast.

Speakers to be announced.
For more information, contact Bill Chaney
831-759-7359 or email at wechaney@ucdavis.edu
1432 Abbott Street, Salinas, CA 93901

SALINAS VALLEY WEED SCHOOL 2006

Tuesday, October 31, 2006
8:00 a.m. to 12:00 Noon
Monterey County Agricultural Center
Richard W. Nutter Conference Room
1432 Abbott Street, Salinas, California

8:00 **Registration (no fee required) and Herbicide Symptom Exhibit**
8:30 Rethinking Weed Management in Landscapes
Cheryl Wilen, Area IPM Advisor, San Diego County
9:00 Weed Control Strategies for 80-inch Bed Culture
Richard Smith, Vegetable Crop and Weed Science Farm Advisor, Monterey County
9:30 Precision Cultivation, Implications, and Costs for Weed Control
Steve Fennimore, Extension Vegetable Weed Specialist, U.C., Davis, Salinas
Laura Tourte, Farm Management Farm Advisor, Santa Cruz County
10:00 **Break and Herbicide Symptom Exhibit**
10:30 Soil Herbicide Carryover, the Constant Need for Caution
Steve Fennimore, Extension Vegetable Weed Specialist, U.C., Davis, Salinas
11:00 New Weed Control Strategies in Onions
Grant Poole, Vegetable Crop Farm Advisor, Lancaster Valley (Los Angeles County)
11:30 Development of Glyphosate Resistance in Marestail
Anil Shrestha, Integrated Pest Management Weed Ecologist, Kearney Ag Center, Parlier
12:00 **Conclusion**

For more information, contact Richard Smith
831-759-7357 or email at rifsmith@ucdavis.edu
1432 Abbott Street, Salinas, CA 93901

Afternoon session will be hosted by CAPCA, Monterey Bay Chapter.

Please call ahead for arrangements for special needs; every effort will be made to accommodate full participation.

USE OF NOVEL MITICIDES FOR CONTROL OF TWOSPOTTED SPIDER MITES, *TETRANYCHUS URTICAE*, IN RASPBERRIES

Mark Bolda, UC Cooperative Extension
Santa Cruz, Monterey and San Benito Counties

Introduction: Twospotted spider mites, *Tetranychus urticae*, are a common and at times severe pest in caneberries, including raspberries, on the Central Coast of California. In addition, very few effective materials are currently registered for control of this pest, making growers keen to acquire new miticides in caneberries.

The miticide Savey (hexythiazox) may only be applied once in a growing season to raspberries, meaning Savey may only be applied to caneberries once per calendar year.

The miticide Acramite 50 WS (bifenzate) is registered for use on caneberries, but currently one must wait one year after application before harvesting, meaning it is practically unusable for California caneberry production. The miticide Zeal (etoxazole), while currently registered for use on strawberries, is not yet registered for use on caneberries.

For all of these materials, efficacy data will be useful for future reference, and also for submission of data to regulatory agencies for expansion of current labels.

Materials and Methods:
The miticide trial was done as a randomized complete block design of four 15 foot long by 7 foot wide replicate plots per treatment on Isabela variety raspberry infested with a large, expanding population of twospotted spider mite. As a matter of interest, samples were taken from the buffer bed treated with Savey next to the treatment plot.

Application: A single application of all materials was made on July 15, 2006. Azadirect, in addition to the application made on July 15, was applied July 22 and July 28.
Experimental applications were made at the rate of water carrier of 150 gallons per acre at 150 psi pressure. Applications were made with a motorized backpack sprayer with a hand held spray gun. Refer to the table below for list of treatments:

Number	Treatment	Rate per acre
1.	Untreated Control	-
2.	Acramite 50 WS + Silwet L-77	1 lb + 0.1%
3	Zeal + Silwet L-77	3 oz + 0.1%
4.	Acramite 50 WS + Silwet L-77	0.75 + 0.1%
5.	Azadirect	2 pt
6.	Grower standard- Savey + Silwet L-77	6 oz + 0.1%

Evaluation: Starting July 11, three days previous to application, six raspberry leaflets from approximately four feet in height were collected from each treatment replicate on 2, 7, 12, 21, 27, 35 and 40 days post application, those dates being July 17, July 22 , July 27, August 3, August 11, August 18 and August 23, respectively. Numbers of twospotted mite and predatory mite (very likely all *Phytoseiulus persimilis*) eggs and motiles (namely, nymphs and adults) were counted directly on the underside of each leaflet using a compound microscope.

Results were tested statistically using a multiple comparison procedure (Least Significant Difference at the 95 percent level of significance) to determine whether the means of counts and percentages per treatment were significantly higher or lower from the other treatments.

Results: Numbers of twospotted spider mite eggs were significantly lower in all treatments except Azadirect by 20 days after initial application. This situation continued through 27 days after application. Numbers of twospotted mite motiles were significantly lower in plots treated with Acramite, Zeal and Savey, than the untreated control by 12 days after initial application. By 27 days after initial application, all treated plots had significantly lower numbers of twospotted mite motiles than the untreated control. However, by 35 days after initial application, no significant differences were found in either eggs or motiles. No significant differences were found at any of the sampling dates in numbers of predatory mite eggs or motiles.

Discussion: The miticide Savey continues to be useful in control of twospotted spider mite, and the unregistered miticides Zeal and Acramite look especially promising. Growers should note that there is a considerable lag time (at least 12 days) between the time of application and measurable reduction of this pest.

Interestingly, repeated applications of Azadirect, an agricultural oil, did not have any measurable effect on numbers of predatory mites.

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Twospotted spider mites, / *Tetranychus urticae/*, are a common and at times severe pest in caneberries, including raspberries, on the Central Coast of California.
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Interestingly, repeated applications of Azadirect, an agricultural oil, did not have any measurable effect on numbers of predatory mites.

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Table 1: Twospotted Spider Mite Eggs in Raspberry

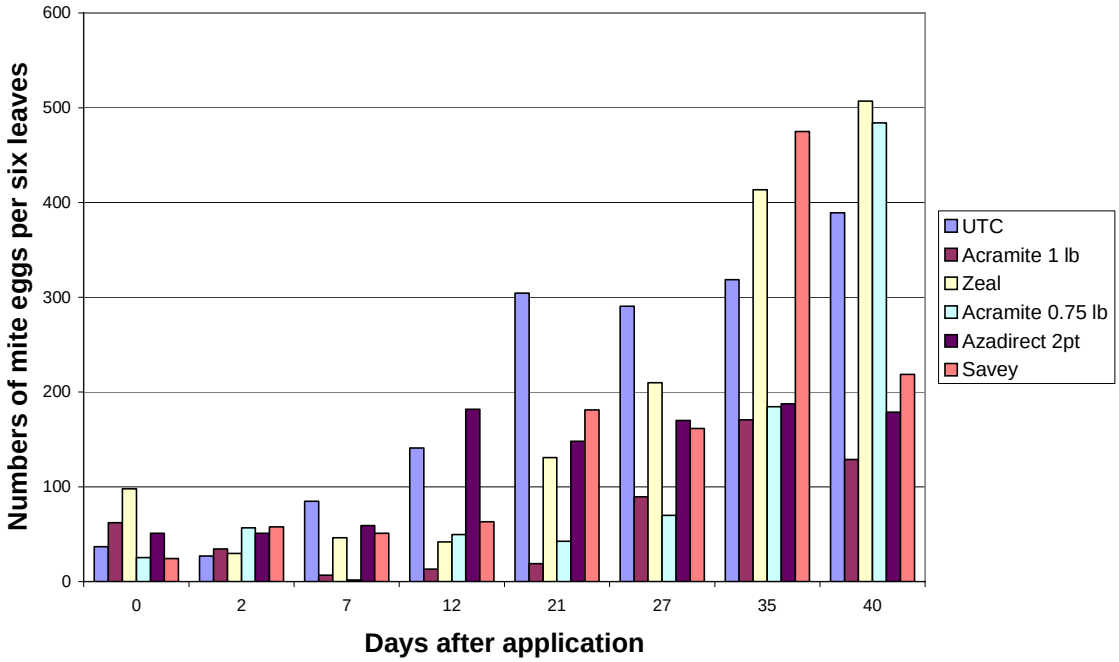

Table 2: Twospotted spider mite adults in raspberry

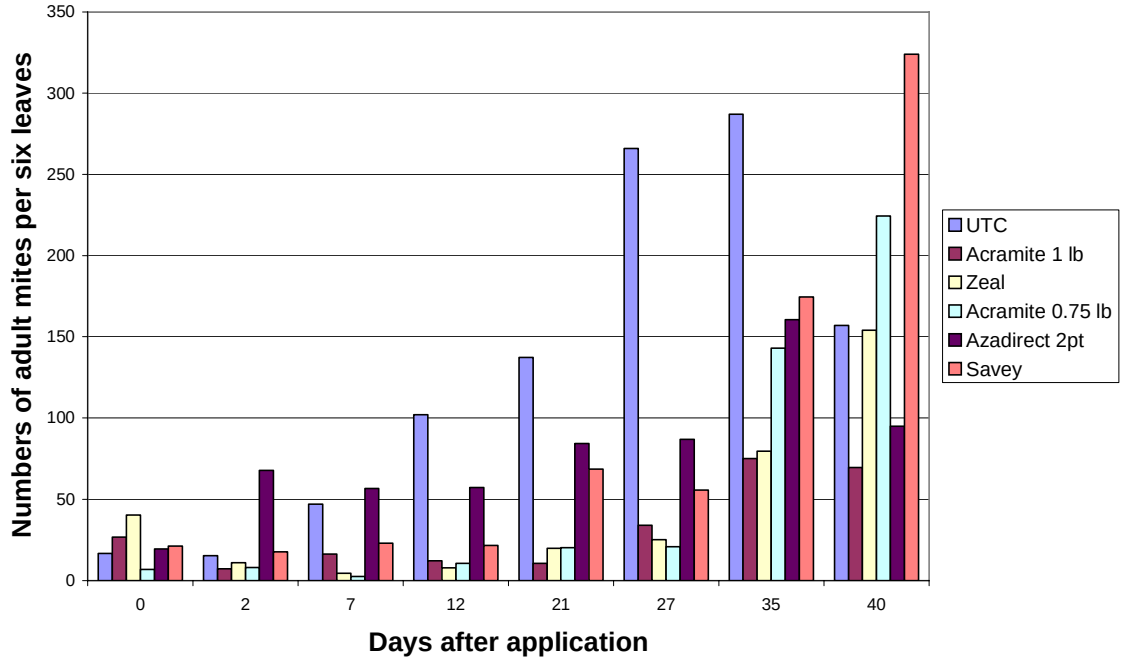

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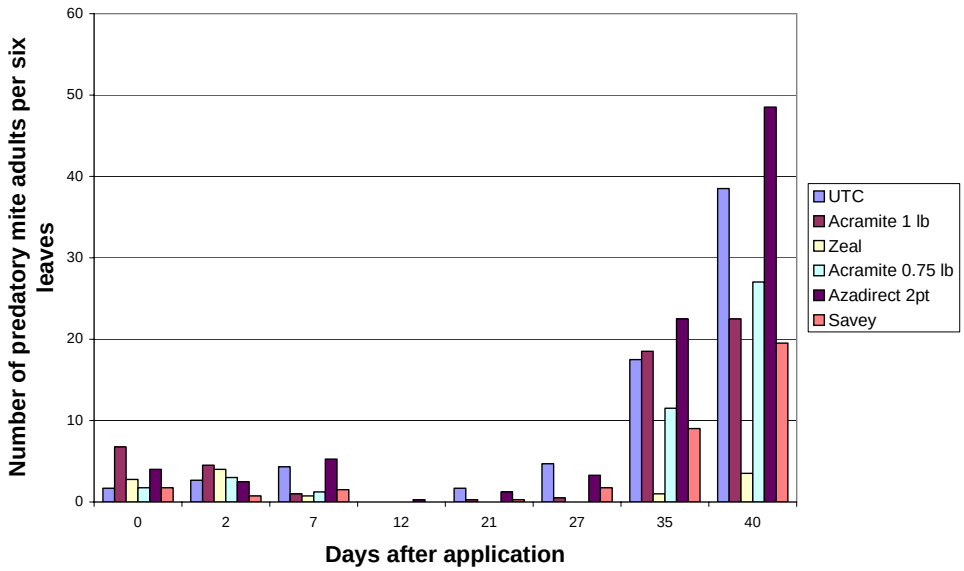
Table 3: Predator mite adults in raspberry



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Evaluation: One day previous to test application, evaluations for thrips infestation commenced. Samples were then taken three, seven and 14 days after the application, or on August 29, September 1 and September 8, respectively. Four samples of five flowers each were taken from the center four rows of each test plot using a container with several drops of methyl isobutyl ketone impregnated cotton to expel thrips from the flowers.

Results were tested statistically using a multiple comparison procedure (Least Significant Difference at the 95 percent level of significance) to determine whether the means of counts and percentages per treatment were significantly higher or lower from the other treatments.

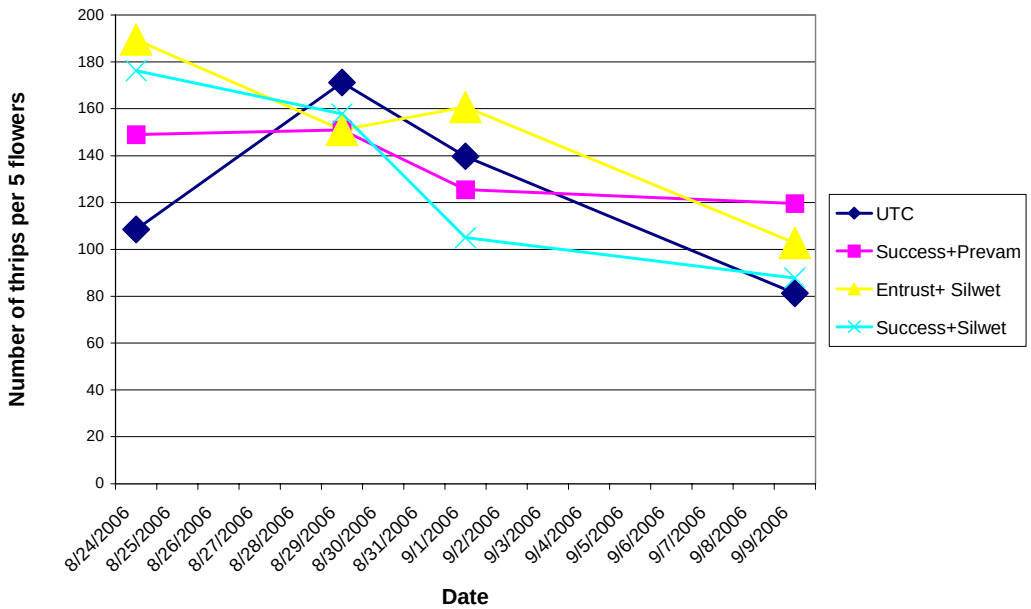
Results and Discussion: The pH of each mixture was found to be at least 6.

Numbers of thrips, while declining over time, did so for each treatment. No statistical differences were detected between any of the treatments on any of the evaluation dates.

The conclusion can be drawn that Success nor Entrust, regardless of the adjuvant, were not effective in controlling Western flower thrips in this study.

I thank Plant Sciences, Inc. and Well Pict for their support and assistance of this test.

Table 1. **Control of Thrips with Success and Entrust in Strawberry**



There are several miticides mentioned for control of twospotted spider mite in this article, including Acramite and Zeal which are not currently registered for use on raspberries.
Before using any miticide, check with your local Agricultural Commissioner's Office and consult product labels for current status of product registration, restrictions, and use information.

The pH of each mixture was found to be at least 6.

Numbers of thrips, while declining over time, did so for each treatment.
The conclusion can be drawn that Success nor Entrust, regardless of the adjuvant, were not effective in controlling Western flower thrips in this study.

Just Published. . .

Seasonal Guide to Environmentally Responsible Pest Management Practices in Peaches and Nectarines
Walter Bentley, Carolyn Pickel, Janine Hasey, Richard Coviello, Mario Viveros, Brent Holtz, Harry Andris, Roger Duncan, Marshall Johnson, Barbara Ohlendorf, Gary Van Sickle
This handy full-color guide takes you through the year based on the stages of peach tree growth with an easy to understand approach to environmentally friendly pest management in peaches. It indicates the best times to monitor specific pests and, when available, gives treatment thresholds and appropriate pesticides to use. Second in a series of "Seasonal Guides." 8 pp. 21625 $7.00

Principles of Weed Control, 3rd Edition
This essential text from the California Weed Science Society is the suggested study guide for the California DPR Pest Control Adviser license in the weed area. It is also supplemental reading material for applicator licensees. The book provides a comprehensive guide to all areas of weed management including nonchemical and chemical control methods and specific integrated weed management programs for various crops. Hardcover. 2002. 630 pp. 3504 $85.00

Landscape Maintenance Pest Control - Patrick J. O'Conner-Marer
This is a complete guide to the management of weed, insect, pathogen, and vertebrate pests in turf, landscape, and interiorscape situations ranging from parks and golf courses to indoor malls. Designed for professionals working in the public or private sector, it focuses especially on pesticide handling and application procedures of importance. More than 200 photos, line drawings, graphs, and sidebars illustrate key concepts and procedures. Review questions similar to those on the exams are included at the end of each chapter. 257 pp. Pub. No. 3493 $30.00

Recently Updated Pest Notes
7249 Soil Fertility Management for Organic Crops
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8196 Understanding Soil Erosion in Irrigated Agriculture
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New Marketing Materials Available
Best Tools for Gardeners
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These colorful new mini-catalogs are available at no charge by request. The 8-page "Gardeners" catalog features titles of interest to home gardeners. The 16 -page "Pest Management" catalog features all of the IPM manuals and the Pesticide Application Compendium along with other IPM best-sellers and study guides. To request a supply of these materials, simply indicate the mini-catalog desired, the quantity, and your shipping address.

For these and other helpful publications, go to anrcatalog.ucdavis.edu

SOIL FERTILITY MANAGEMENT FOR ORGANIC CROPS
Mark Gaskell, Richard Smith, Jeff Mitchell, Steven Koike, Calvin Fouche, Tim Hartz, William Horwath and Louise Jackson.
This publication was just updated and provides an up-to-date source of information for managing soil fertility for organic crops. It discusses various aspects of nitrogen management and nitrogen availability from organic fertilizers, cover crops and mineralization from organic matter. 8 pp. 7249

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Crop Notes

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