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Crop Notes

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In This Issue:

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2010 IRRIGATION AND NUTRIENT MANAGEMENT MEETING AND COVER CROP AND WATER QUALITY FIELD DAY, FEBRUARY 23, 2010

The 2010 Irrigation and Nutrient Management Meeting and Cover Crop and Water Quality Field Day which will be held at the Salinas Community Center on February 23 will provide a number of key discussions of relevance to growers faced with improving the water and nutrient efficiency of their operations, but also for dealing with the impending changes in the Agricultural Regulatory Program (formerly the Agricultural Waiver Program). This year's presentations discuss issues regarding nitrate loss in agricultural production, strategies to more efficiently utilize applied nitrogen, as well as a discussion of the USDA administered Agricultural Water Enhancement Program (AWEP) which will provide money to help provide technical help for irrigation and nutrient management. Following the morning meeting at the community center, we will move to the field and observe runoff trials in a commercial production field. Lunch and refreshment will be provided and CCA and Continuing education credits have been approved. For further information call Richard Smith at 759-7357 or Michael Cahn at 759-7377.

BAGRADA BUG, A VEGETABLE PEST NEW TO CALIFORNIA

Jian Bi, Entomology Farm Advisor

The Bagrada bug, *Bagrada hilaris*, (also known as the painted bug or harlequin bug) is a serious pest of many vegetable crops in East and southern Africa, southern Asia and southern Europe. This bug attacks a broad range of vegetable crops such as cabbage, cauliflower, broccoli, kale, turnip, mustard and radish. This bug also damages papaya, potato, maize, sorghum, cotton, capers and some legumes. The bug feeding causes large stippled or wilted areas on leaves. The growth of newly formed central shoots or heads often becomes stunted. This pest was not known to occur in California and other areas of the United States until it was found in June 2008 in Pasadena, Los Angeles county. Since then, it has been found in Orange, Ventura and Imperial counties of California and Yuma county of Arizona.

Life Cycle and Description

The adult bug is about 1/4 inch long and 1/8 inch broad at its widest area with a shield-shaped body. The upper surface is black with distinctive white and orange markings. The female adult is longer than the male. Adult females lay eggs in clusters on leaves or on the soil underneath host plants. Eggs are barrel shaped, initially white and then turn orange. Eggs hatch in 5-8 days. A female bug can lay up to 100 eggs within 2 to 3 weeks. The nymph is wingless and passes through 5 instars. The initial color is white and then changes to red with dark markings. The life cycle takes 3-4 weeks. The number of generations per year is dependent upon the climatic conditions.

Damage

Adults and nymphs of the Bagrada bug insert their needle-like mouth parts into young leaves and suck out sap, resulting in large stippled or wilted areas on leaves, stunting and possible death of seedling plants. When young seedlings are attacked, feeding at the growth terminal can cause branching such that multiple heads are formed on crops like broccoli and cauliflower. Heavily attacked plants may have a scorched appearance. The highest levels of damage have been seen in organically-grown fields, community gardens and residential gardens.

Management

Regular monitoring of crops is important. Cultural controls can be used to manage the Bagrada bug.

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Frequent cultivation will help to control eggs that are laid on the soil in vegetable fields. Sanitation of crop residue after harvest can reduce the carry-over between crops and seasons. Thus far, effective biological control organisms have not been identified. Malathion, pyrethroid and neonicotinoid-based insecticides are effective in minimizing the damage.

What to do if you see the Bagrada bug?
The Bagrada bug has not been detected in the Central Coast area. If you suspect the Bagrada bug, please contact Jian Long Bi, Entomology Farm Advisor at our Cooperative Extension Office at 831-759-7359.

Bagrada bug is an invasive pest attacking vegetables.


Adult female and male


Eggs


First instar nymphs


Third instar nymph


Damage on cabbage


Damage on Japanese radish

Photo credits: Adult Bagrada bugs and damage on Japanese radish photos by G. Arakelian. Remaining photos are from B. Loehr, icipe.

PIN ROT, HEAD ROT, BROWN BUD, AND OTHER BROCCOLI PROBLEMS

Steven Koike
Plant Pathology Farm Advisor

Broccoli is affected by several head rot diseases and disorders.

Broccoli plantings in 2010 are already having problems. In both coastal and inland counties there are reports of significant rotting of broccoli flower heads. This disease situation is complicated because broccoli head rot problems, also called pin rot, can be due to one or more causes. Samples tested in our UC Cooperative Extension diagnostic lab confirmed that both bacterial head rot and Alternaria head rot are present in fields. This article summarizes information on both head rot types as well as the physiological disorder known as brown bud or brown bead.

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Winter and early spring weather favors development of broccoli head rots.

1. Bacterial head rot. Initial symptoms on the immature broccoli heads consist of a water-soaked or greasy discoloration of the surfaces of small groups of the unopened flowers. Later, the affected portions of the head turn brown to black and the infection spreads and affects larger parts of the head. The tissue usually turns soft and gives off a bad odor. Secondary molds and bacteria cause further decay. Bacterial head rot symptoms can resemble those of Alternaria head rot. However, with bacterial head rot fungal sporulation is absent unless secondary molds colonize the diseased tissues. Because secondary organisms are very often present on the diseased heads and leads to rapid breakdown of tissues, bacterial head rot diagnosis may sometimes be difficult to confirm.

Bacterial head rot is caused by a combination (=complex) of pathogenic bacteria including the following: *Erwinia carotovora subsp. carotovora*, *Pseudomonas fluorescens*, *Pseudomonas marginalis*, *Pseudomonas viridiflava*, and perhaps others. These bacteria are favored by cool, wet weather conditions and presence of condensed water on broccoli flowers. Therefore, bacterial head rot is almost always a winter or spring disease. Extended rainy or foggy weather can particularly result in severe problems. Splashing water from rains or irrigations can spread the bacteria to uninfected broccoli flowers.

Control is difficult to achieve. Some differences in cultivar susceptibility appear to exist, based on architecture and exposure of the broccoli heads. Broccoli heads having domed, and not flat, head shapes are less likely to have severe head rot. Plant these less susceptible cultivars, if available. Avoid using overhead sprinklers, or schedule irrigations to reduce the number and duration of applications during head formation. Protectant sprays have not proven useful in California.

2. Alternaria head rot. *Alternaria* fungal pathogens are very important on broccoli crops worldwide, causing leaf, pod, seed, and head diseases. For the broccoli head rot problem, early symptoms consist of a water-soaked discoloration that later turns dark brown to black. Tissues infected with *Alternaria* are usually not as soft and smelly as heads infected with the bacterial complex. *Alternaria* readily produces its dark green spores on the diseased head tissue. Secondary molds and bacteria cause further decay. Alternaria head rot and bacterial head rot symptoms on broccoli are similar, so diagnosis needs to be carefully done.

Alternaria head rot and related diseases are caused by two species: *Alternaria brassicae* and *A. brassicicola*. The two species are readily distinguished by spore size and shape. *Alternaria brassicae* conidia are very long, have a long appendage (called a beak), and are borne in short chains (up to four spores in a chain). *Alternaria brassicicola* conidia are much shorter, lack a long beak, and are borne in longer chains of 20 or more spores. Both pathogens are seedborne and can enter a production field via infested seed. Splashing water and winds can disperse spores onto broccoli heads. Water present on broccoli heads allows spores to germinate and infect the flowers. As for bacterial head rot, Alternaria head rot is usually most common and most severe in the wet and cold weather of winter and spring.

Because the various head rots look similar, accurate diagnosis usually requires lab tests.

For controlling Alternaria head rot, use seed that has been tested and found to not have detectable levels of the pathogen, or that has a pathogen level below significant thresholds. Some differences in cultivar susceptibility appear to exist, based on architecture and exposure of the broccoli heads. Broccoli heads having domed, and not flat, head shapes are less likely to have severe head rot. Avoid using overhead sprinklers, or schedule irrigations to reduce the number and duration of applications during head formation. Some field personnel report that protectant fungicide sprays provide some control of Alternaria head rot. However, successful control via sprays is not consistent. The extremely waxy broccoli flower surface, interference from surrounding foliage, and scheduling challenges regarding when and how often to spray make this disease difficult to control with fungicides.

3. Brown bud or brown bead. This problem is a physiological disorder of broccoli flowers and is unrelated to bacterial or Alternaria head rots. Possibly due to nutritional imbalances or deficiencies, brown bud disorder results in discolored, brown flower bud tissue. Therefore, symptoms of brown bud can closely resemble those of the head rots caused by pathogens. Also, broccoli flowers affected by brown bud can later be colonized by pathogenic bacteria, one or both species of *Alternaria*, or by secondary decay microorganisms. Diagnosis of head rot problems, therefore, should be conducted carefully and with laboratory support.

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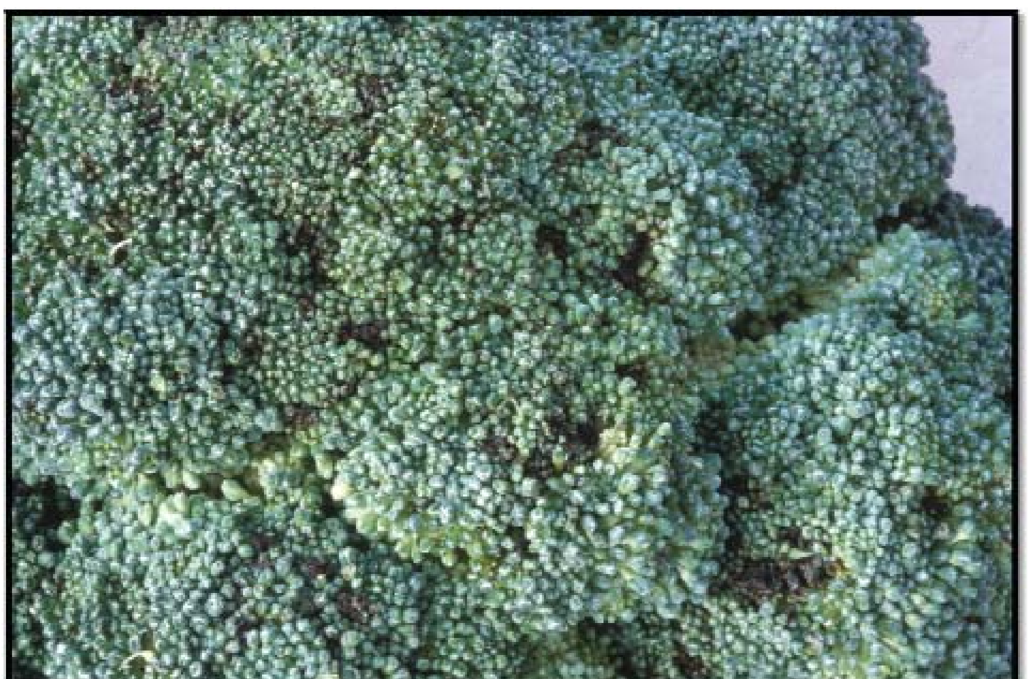
Damaged broccoli head affected with bacterial head rot.



Multiple infection sites of Alternaria head rot disease.

ACIDIFICATION OF TANK MIX TO ENHANCE THE EFFICACY OF ORGANICALLY REGISTERED PESTICIDES FOR CONTROL OF SPOTTED WING DROSOPHILA, *DROSOPHILA SUZUKII.*

Mark Bolda, UC Cooperative Extension, Santa Cruz County

Previous posts have outlined several pesticides which are very effective in controlling spotted wing drosophila, *Drosophila suzukii* (SWD) in berry crops. Unfortunately, similar levels of success have not yet been achieved in organic production systems.

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As it is well known that many pesticides such as pyrethrins, pyrethroids and some organophosphates (but definitely NOT spinosyns for which the opposite is true) are more active when applied in acidic tank mixes. The following study addresses this hypothesis in controlling spotted wing drosophila, in organically managed raspberries.

Table 1 below describes the treatments which were made. Applications were made on November 18, 2009. Tank mix was acidified with Mixwell water conditioner and adjusted using a hand held pH meter. It is notable that it did not take much MixWell to acidify the six gallon tank mix, a mere 10 ml brought a pH 7.8 mix down to 5.8!

Water carrier rate was the equivalent of 180 gallons per acre, and applications were made with a backpack sprayer.

Sampling was done differently in this study than in others. Owing to the relatively low numbers of flies in the plots, a "buc vac" was utilized. A 36 foot section of hedgerow was sampled on both sides, and these sections were not sampled again in the course of the study. Flies and other insects caught in the net are emptied into a large, labeled Ziploc bag, frozen and counted in the lab later on. Continuing work with the "bug vac" shows that these are quite effective in removing flies from the sampled area.
Samples taken resulted in male SWD (distinguishable by the single large spot on the back of each wing) being a large proportion of the sample, in most cases at least half, so the assumption is that the some proportion of the other half was female SWD. While the chart below uses total numbers of vinegar flies collected, males and what were assumed to be females (but could in fact be regular vinegar flies since they were not sexed) were counted separately for later reference if necessary.

Treatment	Rate per acre	Adjusted pH
Pestout	1% v/v	pH 5.8
Pyganic 1.4	64 oz	pH 7.5
Pyganic 1.4	64 oz	pH 5.5
Untreated Control	-	-

Results

	"Females"	Males	Total	"Females"	Males	Total
	11/17/2009	11/17/2009	11/17/2009	11/19/2009	11/19/2009	11/19/2009
PestOut @ 1% 5.8 pH	9.33 a	4.67 a	14.00 a	0.67 a	1.33 a	2.00 b
Pyganic 64 oz/A 7.5 pH	9.33 a	7.33 a	16.67 a	0.33 a	0.33 a	0.67 b
Pyganic 64 oz/A 5.5 pH	15.67 a	6.67 a	22.33 a	0.67 a	0.00 a	0.67 b
Untreated Control	11.67 a	6.33 a	18.00 a	3.67 a	5.00 a	8.67 a

	"Females"	Males	Total
	11/20/2009	11/20/2009	11/20/2009
PestOut@ 1% 5.8 pH	15.67 a	7.67 a	23.33 a
Pyganic 64 oz/A 7.5 pH	13.67 a	5.33 a	19.00 a
Pyganic 64 oz/A 5.5 pH	4.33 a	6.33 a	10.67 a
Untreated Control	8.67 a	13.33 a	22.00 a

Means followed by the same letter do not significantly differ (P=0.05, Student-Newman Keuls)

Spraying with Pyganic or Pestout with either tank mix pH modification arrived at the same result. Numbers of total flies fell significantly one day after application, but two days after application no statistical differences were found between any of the treatments and the untreated control.

It is apparent that acidification of the tank mix makes no difference in the efficacy of Pyganic. Addition-

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ally, this work underlines that the efficacy against vinegar flies of Pyganic or the horticultural oil PestOut is limited to one day.

There are several insecticides mentioned for control of vinegar flies in this article. Before using any insecticides, check with your local Agricultural Commissioner's Office and consult product labels for current status of product registration, restrictions, and use information.

EFFICACY OF NOVEL INSECTICIDES ON APHID MANAGEMENT IN LETTUCE

Jian Bi, Entomology Farm Advisor, UC Cooperative Extension
Ryan Bounds, R&D Scientist, Syngenta Crop Protection, Inc.
Lionel Handel, Senior PCA, Kleen Globe, Inc.

Aphids are important pest in Lettuce crop at the Central Coast.

Aphids are important pest in lettuce crop at the Central Coast. These aphids cause economic damage to lettuce crop through direct injury, virus transmission and contamination. Although predators and parasites have been used to control this pest with variable efficacy, the use of chemical insecticides still remains the most effective way to suppress the pest populations on various crops. Repeated applications of same insecticide exert tremendous selective pressure on pest populations, resulting in increased potential for development of resistance. Introduction of novel insecticides into the current insect pest control program is a valuable tactic for resistance management. Here we report results for several novel insecticides against aphids in lettuce from our 2009 field trials.

The experiment was conducted in a commercial head lettuce field in the Boronda area of Salinas. Head lettuce seeds were planted on July 23 in two rows on 40-inch wide beds. The plants were thinned on August 13 to 8 inches apart in rows. The following novel insecticides were tested: Durivo 2.5 SC, Coragen 1.67 SC, Voliam Flexi WG, Voliam Xpress ZC and Movento. Platinum SG and Admire Pro were applied as comparisons. Durivo is a pre-mixture of active ingredients from Platinum and Coragen. Voliam Flexi is a pre-mixture of active ingredients from Actara and Coragen while Voliam Xpress is a mixture from Warrior and Coragen. Broader spectrum of insect pest control is expected from these mixtures.

Insecticides applied at the recommended concentrations were as follows: Durivo at 13.0 fl oz/acre, Coragen at 5.13 fl oz/acre, Voliam Flexi at 7.0 oz/acre, Voliam Xpress at 9 fl oz/acre, Movento at 5.0 fl oz/acre, Platinum at 3.67 oz/acre and Admire Pro at 10.5 fl oz/acre. Durivo, Coragen, Platinum and Admire Pro were shanked on August 28 into the center of the bed in 20 gallons per acre. Durivo was also applied as a direct spray toward the crown of plants with a four-nozzle handled boom calibrated to deliver 60 gallons per acre. Voliam Flexi, Voliam Xpress and Movento were applied as foliar sprays on August 28, September 11 and 18 with a rate of 30 gallons per acre. Control plots were left untreated. Aphids were sampled every 3-7 days from September 1 to the harvest maturity.

Durivo, Voliam Flexic, Voliam Xpress and Movento are all effective against aphids.

Aphids presented in the experimental plots were exclusively the green peach aphid, *Myzus persicae* (Sulzer) and the lettuce aphid, *Nasonovia ribisnigri* (Mosley). Our results showed that Durivo, Admire Pro, Platinum and Coragen started to be effective on decreasing the total adult aphid numbers at 11 days post application (Table 1). From 24 to 31 days post treatment, all of these insecticides significantly reduced the numbers (Table 1). Deep- and surface-soil applied Durivo showed similar efficacy against the adult aphids (Table 1). These soil applied insecticides also started to decrease numbers of total immature aphids at 11 days post treatment (Table 2). From 27 to 31 days post treatment, all the insecticides significantly suppressed the numbers (Table 2). Durivo applied to soil surface had a similar effect as it applied to deep soil.

Our results demonstrated that Voliam Flexi and Voliam Xpress significantly reduced the total adult numbers on sampling dates of Sept 8, 11, 16, 21, 25 and 29, whereas Movento significantly decreased the numbers on Sept 16, 21, 25 and 29 (Table 1). To immature aphids, these foliar applied insecticides all decreased the total numbers on Sept 16, 21, 25 and 29 (Table 2). It should be noticed that Movento has recently been ordered by the court to be removed from store shelves for further evaluation of its toxicity to honey bees.

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Table 1. Effect of insecticide treatments on total numbers of adult aphids (adults/plant)

Treatment	Sept 1	Sept 4	Sept 8	Sept 14	Sept 16	Sept 21	Sept 25	Sept 29
Durivo surface soil	0 b	0 a	0 c	0.08 ± 0.04 bcd	0.15 ± 0.06 ab	0 b	0.05 ± 0.05 b	0.30 ± 0.15 b
Durivo deep soil	0.13 ± 0.05 a	0.03 ± 0.03 a	0 c	0.03 ± 0.03 cd	0.13 ± 0.06 bc	0 b	0.15 ± 0.08 b	0 b
Admire Pro	0.05 ± 0.03 ab	0.05 ± 0.03 a	0.05 ± 0.03 bc	0.15 ± 0.07 abc	0.13 ± 0.05 abc	0 b	0.15 ± 0.08 b	0 b
Platinum	0.03 ± 0.03 b	0 a	0 c	0.05 ± 0.03 cd	0.10 ± 0.05 bc	0.05 ± 0.05 b	0.35 ± 0.17 b	0.10 ± 0.07 b
Coragen	0.03 ± 0.03 b	0 a	0 c	0.10 ± 0.05 abcd	0.15 ± 0.06 ab	0.20 ± 0.14 b	0.35 ± 0.15 b	0.05 ± 0.05 b
Voliam Flexi	0.03 ± 0.03 b	0 a	0 c	0.03 ± 0.03 cd	0.10 ± 0.05 bc	0 b	0.10 ± 0.07 b	0 b
Voliam Xpress	0.05 ± 0.03 ab	0 a	0 c	0 d	0 c	0 b	0.15 ± 0.08 b	0 b
Movento	0 b	0.05 ± 0.03 a	0.08 ± 0.04 ab	0.20 ± 0.07 ab	0.10 ± 0.05 bc	0 b	0.05 ± 0.05 b	0 b
Untreated control	0.03 ± 0.03 b	0.03 ± 0.03 a	0.13 ± 0.05 a	0.23 ± 0.07 a	0.28 ± 0.08 a	0.50 ± 0.22 a	1.10 ± 0.49 a	1.30 ± 0.74 a

Means in a column followed by different letters are significantly different at P < 0.05.

Table 2. Effect of insecticide treatments on total numbers of immature aphids (nymphs/plant)

Treatment	Sept 1	Sept 4	Sept 8	Sept 14	Sept 16	Sept 21	Sept 25	Sept 29
Durivo surface soil	0 b	0 b	0 b	0 a	0 b	0 c	0 c	0 c
Durivo deep soil	0.20 ± 0.09 a	0.15 ± 0.08 a	0.03 ± 0.03 b	0.03 ± 0.03 a	0 b	0 c	0.05 ± 0.05 c	0 c
Admire Pro	0.03 ± 0.03 b	0.05 ± 0.03 ab	0.05 ± 0.05 b	0 a	0.08 ± 0.04 ab	0.20 ± 0.16 bc	0.20 ± 0.12 c	0.35 ± 0.22 c
Platinum	0.10 ± 0.06 ab	0.03 ± 0.03 b	0.03 ± 0.03 b	0 a	0.05 ± 0.03 ab	0 c	0 c	0 c
Coragen	0.08 ± 0.04 ab	0.08 ± 0.04 ab	0 b	0 a	0.15 ± 0.06 a	1.05 ± 0.76 ab	2.4 ± 1.44 b	1.70 ± 0.49 b
Voliam Flexi	0.08 ± 0.06 ab	0 b	0 ab	0 a	0 b	0 c	0 c	0.05 ± 0.05 c
Voliam Xpress	0.08 ± 0.06 ab	0.03 ± 0.03 b	0.10 ± 0.06 b	0 a	0.03 ± 0.03 b	0.10 ± 0.07 bc	0.30 ± 0.18 c	0.30 ± 0.18 c
Movento	0.03 ± 0.03 b	0 b	0.08 ± 0.04 ab	0.05 ± 0.03 a	0 b b	0.05 ± 0.05 bc	0.65 ± 0.50 bc	0.10 ± 0.07 c
Untreated control	0.08 ± 0.06 ab	0 ab	0.15 ± 0.07 a	0.05 ± 0.03 a	0.23 ± 0.15 a	2.45 ± 1.66 a	3.35 ± 0.85 a	7.95 ± 3.14 a

Means in a column followed by different letters are significantly different at P < 0.05.

FURTHER CHEMICAL EFFICACY TRIALS FOR MANAGEMENT OF SPOTTED WING DROSOPHILA, DROSOPHILA SUZUKII, IN RASPBERRIES

Mark Bolda, UC Cooperative Extension
Ed Shaw, Driscoll Strawberry Associates

Introduction: An August 2009 field trial demonstrated the efficacy of malathion and zeta-cypermethrin (Mustang) against the spotted winged drosophila (SWD), Drosophila suzukii in raspberries. Please see the September/October edition of Monterey Crop Notes or the following link for a fuller description of this study:

http://ucanr.org/blogs/strawberries_caneberries/

The following summary reports efficacy of additional materials trialed against SWD in December 2009.

Materials and Methods:

Chemical	Treatment Rate per acre	Water Carrier Rate per acre
Malathion	64 fl oz	179 gallons
Delegate (spinetoram)	6 oz	179 gallons
HGW86 (Cyantraniliprole) **Not Registered in Caneberry**	398.6 ml	179 gallons
Altacor (Chlorantraniliprole) **Not Registered in Caneberry**	64 fl oz	179 gallons
Actara (Thiamethoxam)	129.6 g	179 gallons
Untreated Control	-	-

Products were applied on December 3, 2009 with a Maruyama 056 gas powered back pack sprayer at maximum labeled rates in 179 gallons water per acre and 150 psi. Each plot was 1,173 sq ft of a proprietary raspberry variety under polyethylene-covered tunnels.

Pre- and post-treatment estimations of SWD were made with a D-Vac Model 122 (hand carry) gas-powered insect sampling device operated at an airflow capacity of 280 cu ft per minute per square foot at the opening of the collecting head. Each side of a 36-ft section of 4-ft high hedge row was sampled. Collected samples were transferred from the D-Vac into Ziploc bags for transport back to the lab where they were frozen for approximately an hour prior to counting.

Because male SWD (easily distinguished by the black spot on their forewings) comprised over half the total **Drosophila** captured in most samples, we assumed the remaining fraction of **Drosophila** to be female SWD (which do not have spotted wings). Results are reported as total (male + female) SWD. However, because the species of the females was not confirmed, they will be given in the results as “females”.

In order to evaluate the impact of treatments on incidence of fruit infestation by larval SWD, thirty marketable fruit were collected from the center of each treatment replicate prior to treatment and then 7-, 14-, 21- and 28-days post-application. Fruit samples were placed in 4x6x12-inch plastic bags fixed with a 1x ¾-inch PVC screened vent tube sealing the open ended of the rearing bag. After two weeks, the numbers of larvae, pupae and adults were enumerated.

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Results:

Table 1: Total numbers of male + "female" SWD captured in D-Vac samples

	Pre-application	Post One Day	Post One Week	Post Two Weeks	Post Three Weeks
	12/3/2009	12/4/2009	12/9/2009	12/16/2009	12/23/2009
Altacor	8.0 a	28.7 a	3.3 bc	49.3 a	6.3 a
Actara	13.0 a	38.0 a	6.0 abc	48.7 a	6.0 a
UTC	17.7 a	38.0 a	7.3 ab	62.3 a	4.7 a
Delegate	8.3 a	18.0 a	2.3 bc	18.7 a	4.7 a
Malathion	12.7 a	10.3 a	1.7 c	14.3 a	1.0 a
HGW86	12.0 a	33.0 a	9.0 a	46.7 a	2.3 a

Means followed by the same letter do not significantly differ (P=0.05, Student-Newman Keuls)

Table 2: Infested fruit

	Pre-Application	Post One Week	Post Two Weeks	Post Three Weeks
	12/3/2009	12/9/2009	12/16/2009	12/23/2009
Altacor	10.3 a	2.7 b	0.3 b	4.3 ab
Actara	4.7 ab	3.0 b	1.7 b	2.3 ab
UTC	8.7 ab	9.0 a	0.7 b	6.3 a
Delegate	3.3 b	0.3 b	0.0 b	0.0 b
Malathion	8.7 ab	2.0 b	0.7 b	0.3 b
HGW86	6.0 ab	1.7 b	0.7 b	3.3 ab

Means followed by the same letter do not significantly differ (P=0.05, Student-Newman Keuls)

The effect of Delegate and Malathion was most notable in the evaluation of infested fruit (Table 2). Although all treated fruit collected one week after application demonstrated significantly lower levels of infestation than the untreated control, Delegate and Malathion treatments continued to show significant levels of control up to three weeks after application.

Conclusion: This study demonstrates that Delegate is as effective as malathion in controlling SWD at relatively low population levels as those encountered during December 2009.

There are several insecticides mentioned for control of vinegar flies in this article. Before using any insecticides, check with your local Agricultural Commissioner's Office and consult product labels for current status of product registration, restrictions, and use information.

We are very grateful for the cooperation of Dutra Farms and Chris Hogan for providing the test site.

LEEK, GREEN ONION, BEETS AND CARROT WEED CONTROL TRIALS - 2009

Richard Smith and Miriam Silva Ruiz, Farm Advisor and Research Assistant
University of California Cooperative Extension, Monterey County

Summary: In spite of development of few new herbicides for use on specialty vegetable crops, there continues to be a need to develop and improve weed control options for these crops. One strategy for specialty crops include finding new uses for old herbicides. In these studies we examined familiar herbicides for use on crops for which they are not currently registered to provide general weed control or to help control a specific weed such as yellow nutsedge.

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In leeks, both pre and post emergence applications of Goal Tender provided excellent weed control; however the 4.0 ounce/A rate of Goal Tender was the safest rate for post emergence application to leeks. In green onions, the preemergence use of Prowl H20 provided the best weed control of any other preemergent herbicide in the trial. In the beet trial Dual Magnum at 0.67 pint/A provided good weed control and yielded equivalent to RoNeet, but had moderately high phytotoxicity. In the carrot trial Dual Magnum and Outlook were able to inhibit the resprout of yellow nutsedge when applied at the 3 true leaf stage in conjunction with Lorox. In this scenario Lorox burned back the yellow nutsedge (but does not inhibit resprouting) and Dual Magnum and Outlook inhibit resprouting. We are working with the IR4 project and manufacturers on the registration processes for these uses.

Methods: Leek Trial: Trial was conducted in a commercial production field near San Juan Bautista. The trial was transplanted on July 17 and the pre transplant applications were made to shaped beds on July 16; two inches of irrigation water was applied immediately post transplant. Post transplant applications were made on July 30. The soil at the site was Sorrento silt loam. Each plot was one 40-inch bed wide by 15 feet long and replicated three times in a randomized complete block design. **Green Onion Trial:** Trial was conducted in a commercial green onion field near Gonzales. The trial was planted on July 17 and the post plant preemergence applications were made on the same day. The post emergence application was applied when the plants had 2-3 true leaves on August 13. The soil at the site was Mocho silt loam. Each plot was one 80-inch bed wide by 10 feet long and replicated three times in a randomized complete block design. Beet Trial: The trial was conducted in a commercial production field near San Juan Bautista. The trial was planted on August 4. Post plant preemergence treatments were applied on August 5 and the irrigation water was started the same day. Each plot was one 40 inch bed wide by 10 feet long and replicated 3 times in a randomized complete block design. **Carrot Trial:** Trial was conducted in a commercial production field with a uniform and high population of yellow nutsedge near San Lucas. Dual Magnum and Outlook do not control yellow nutsedge post emergence, however can inhibit nutsedge resprouting when applied following burn down of nutsedge with an acid fertilizer or other post emergence herbicide. Dual Magnum and Outlook were applied at the 3-4 true leaf stage of the carrots on July 30 in conjunction with the post emergence application of Lorox (which was capable of burning back yellow nutsedge but not capable of inhibiting subsequent reemergence of this weed). Lorox was applied on July 31 with a commercial application rig and the site was watered on August 1. A mid-growth biomass evaluation was conducted in which 3 feet of row were harvested and the plants evaluated for root and foliage growth, as well as stand. The soil type at the site was Rincon clay loam and each plot was 15 feet long by one 40-inch bed wide and randomized in a complete block design with three replications. **General information for all trials:** See tables for evaluations and dates. All applications were made with a CO2 backpack sprayer with two passes of a one-nozzle wand with an 8008E tip at 30 psi applying the equivalent of 72 gallons per acre.

Results: ***Leek Trial:*** The main weeds were hairy nightshade and common purslane. There were 24.7 weeds per 22.5 ft^2 in the untreated control and the pretransplant materials, Dacthal, Prefar, Prowl H2O and Goal Tender at 0.25 lb a.i./A all had less than 8.3 weeds per 22.5 ft^2 (Table 1). Goal Tender applications at all rates and application timings had less than 1.0 weed per 22.5 ft^2. All rates of Goal Tender applied post emergence had the lowest time per acre to weed. All treatments had acceptable phytotoxicity ratings on the August 5 and 19 and the September 24 evaluation dates, however the post emergence applications of Goal Tender at the highest rates always had the highest ratings (Table 2). There were no significant differences in the yield of leeks in any of the treatments.

Green Onion Trial: Shepherd's purse was the main weed at this site. Goal Tender provided good weed control, but had unacceptably high phytotoxicity on August 13 (26 days after germination) (Table 3). The preemergence application of Prowl H2O controlled all weeds by had moderate phytotoxicity. Nortron was the only other preemergent that significantly reduced the number of weeds on this evaluation date. Post emergence applications of Prowl H2O had lower yields than the preemergence application because it does not control weed post emergence (Table 4). The highest yield was the preemergence application of Prowl H2O which provided excellent, season-long weed control.

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Beet Trial: Weeds at the site were mostly malva and nettleleaf goosefoot. Dual Magnum at 1.0 and 1.33 pints/A provided the most complete weed control; however, Dual Magnum at 1.33 pints/A had unacceptable phytotoxicity (Table 5). Weeding time was lowest in all Dual Magnum treatments. There were no differences in yield among the treatments, but there is a clear trend indicating lower tonnage in the two higher rates of Dual Magnum.

Carrot Trial: Both rates of Outlook and Dual Magnum at 1.33 and 1.67 pint/A had the best weed control on the first evaluation date on August 19(20 days after treatment - DAT); however, these four treatments also had the highest phytotoxicity ratings (Table 6). Phytotoxicity consisted of burning back and necrosis of leaf tissue (see photos below). On the second evaluation date on September 10 (42 DAT), All treatments provided good weed control. Both rates of Outlook had greater phytotoxicity than all Dual Magnum treatments. Mid-growth biomass evaluations on September 10 indicated that all treatments had smaller roots than the untreated control. In the treated plants a higher percentage of the plant was dedicated to foliage than to roots than the untreated. There were no statistically detected differences in the number of plants or total root tonnage per acre.

For complete report on these trials go to:
http://cemonterey.ucdavis.edu/Vegetable_Crops/Weed_Reports.htm

Table 1. Leek trial: Weed counts (per 22.5 sq. ft) and time of weeding evaluation on August 5.

	Treatment	Material/A	Lbs a.i./A	Application Timing	Common Purslane	Hairy nightshade	Lambs-quarter	Sow Thistle	Little Mallow	Total Weeds	Weed time hr/A
1	Untreated	----	----	----	9.0	9.3	4.0	0.7	1.7	24.7	9.8
2	Dacthal 6F	1.33 gals	8.0	Pre transplant	0.7	3.7	0.3	0.0	2.3	7.0	4.0
3	Prefar 6E	6.0 quarts	6.0	Pre transplant	1.0	4.0	0.3	0.0	1.0	6.3	3.8
4	Prowl H2O	33.7 oz	1.00	Pre transplant	2.0	3.0	2.0	0.7	0.7	8.3	4.2
5	Goal Tender 4F	8.0 oz	0.25	Pre transplant	0.0	1.3	4.7	0.3	0.7	7.0	3.2
6	Goal Tender 4F	16.0 oz	0.50	Pre transplant	0.0	0.7	0.3	0.0	0.0	1.0	1.8
7	Goal Tender 4F	24.0 oz	0.75	Pre transplant	0.0	0.0	0.0	0.3	0.0	0.3	1.7
8	Goal Tender 4F	4.0 oz	0.125	Post transplant	0.0	0.0	0.0	0.3	0.0	0.3	1.5
9	Goal Tender 4F	6.0 oz	0.188	Post transplant	0.0	0.0	0.0	0.0	0.0	0.0	1.5
10	Goal Tender 4F	8.0 oz	0.25	Post transplant	0.0	0.0	0.0	0.0	0.0	0.0	1.4
	Pr>Treat				<0.001	<0.001	2.570	0.594	0.012	<0.001	<0.001
	$LSD_{0.05}$				2.9	3.5	NS	NS	1.3	7.7	1.7

Table 2. Leek trial: Phytotoxicity ratings on three dates and yield evaluation on September 24, 2009.

Treatment	Material/A	Lbs a.i./A	Application Timing	Phyto[1] Aug 5	Phyto[1] Aug 19	Phyto[1] Sept 24	Weight/10 plants (lbs)	Grams per plant
Untreated	----	----	----	0.0	0.0	0.7	3.27	148
Dacthal 6F	1.33 gals	8.0	Pre transplant	0.0	0.0	0.0	3.65	166
Prefar 6E	6.0 quarts	6.0	Pre transplant	0.0	0.0	0.0	3.49	158
Prowl H2O	33.7 oz	1.00	Pre transplant	0.0	0.0	0.0	3.62	164
Goal Tender 4F	8.0 oz	0.25	Pre transplant	0.3	0.0	0.0	3.50	159
Goal Tender 4F	16.0 oz	0.50	Pre transplant	0.0	0.0	0.0	4.06	184
Goal Tender 4F	24.0 oz	0.75	Pre transplant	0.0	0.7	0.0	3.87	176
Goal Tender 4F	4.0 oz	0.125	Post transplant	1.7	1.3	0.0	3.55	161
Goal Tender 4F	6.0 oz	0.188	Post transplant	2.0	1.7	0.0	3.44	156
Goal Tender 4F	8.0 oz	0.25	Post transplant	2.0	2.0	2.0	3.15	143
Pr>Treat				<0.001	<0.001	0.001	0.272	0.272
$LSD_{0.05}$				0.5	0.6	0.8	NS	NS

1 – Phytotoxicity rating scale: 0 = no crop damage to 10 = crop dead (a value >2.0 is not considered acceptable)

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Table 3. Green Onion Trial: Weed count (per 2 sq ft) and phytotoxicity rating on August 13

Treatment	Material/A	Lbs a.i./A	Application Timing	Shepherd's Purse	Burning Nettle	Little Mallow	Common Purslane	Total Weeds	Phyto[1]
Untreated	----	----	----	21.7	2.3	0.7	2.3	27.0	0.0
Dacthal 6F	1.33 gals	8.0	Preemergence	21.0	0.0	0.3	0.0	21.3	0.0
Goal Tender 4F	1.0 oz	0.0312	Preemergence	4.3	0.0	0.0	0.0	4.3	5.3
Nortron 4SC	32 oz	1.00	Preemergence	18.7	0.7	0.0	0.0	19.3	0.0
Prowl H2O 3.8	33.7 oz	1.00	2-3 true leaf	16.3	2.7	0.0	3.0	22.0	0.0
Prowl H2O 3.8	67.4 oz	2.00	2-3 true leaf	18.0	2.7	0.3	3.3	24.3	0.0
Prowl H2O 3.8	134.8 oz	4.00	2-3 true leaf	16.0	2.3	0.0	1.7	20.0	0.0
Prowl H2O 3.8 FB Prowl H2O 3.8	67.4 oz 67.4 oz	2.00 2.00	Preemergence 2-3 true leaf	0.0	0.0	0.0	0.0	0.0	3.0
Pr>Treat				<0.001	0.135	0.149	<0.001	<0.001	<0.001
$LSD_{0.05}$				7.1	NS	0.6	1.5	7.6	0.8

Table 4. Green Onion Trial: Yield (per 2 ft2 of bed top) on September 17, 2009

Treatment	Material/A	Lbs a.i./A	Application Timing	Onion wt kilograms	Number of plants	Wt/plant grams
Untreated	----	----	----	0.09	64	1.3
Dacthal 6F	1.33 gals	8.0	Preemergence	0.32	69	4.6
Goal Tender 4F	1.0 oz	0.0312	Preemergence	0.17	50	3.8
Nortron 4SC	32 oz	1.00	Preemergence	0.33	80	4.1
Prowl H2O 3.8	33.7 oz	1.00	2-3 true leaf	0.17	74	2.3
Prowl H2O 3.8	67.4 oz	2.00	2-3 true leaf	0.29	73	3.9
Prowl H2O 3.8	134.8 oz	4.00	2-3 true leaf	0.38	80	4.9
Prowl H2O 3.8 FB Prowl H2O 3.8	67.4 oz 67.4 oz	2.00 2.00	Preemergence 2-3 true leaf	0.60	85	7.1
Pr>Treat				<0.001	0.158	<0.001
$LSD_{0.05}$				0.16	NS	1.6

Table 5. Beet Trial: Weed count (per 18 ft2), phytotoxicity and weed time on September 1 and yield evaluation on October 9.

Treatment	lbs a.i./A	Material/A	Malva	Shep. Purse	NLGF	Sow thistle	Nettle	Other weeds	Total weeds	Phyto	Weed time (hr/A)	Yield plants/A	Yield ton/A
RoNeet 6E	3.0	4.00 pints	1.7	5.0	3.0	1.0	0.7	1.0	12.3	3.3	8.23	153,549	28.5
Dual Magnum 7.63	0.63	0.67 pints	1.3	2.7	3.3	1.0	0.0	1.0	9.3	3.0	4.30	141,381	27.9
Dual Magnum 7.63	0.95	1.00 pints	0.7	3.0	0.3	0.0	0.0	0.3	4.3	3.3	4.33	120,162	22.0
Dual Magnum 7.63	1.27	1.33 pints	0.0	2.3	1.3	0.0	0.0	0.3	4.0	6.3	4.65	133,288	23.5
Untreated	---	---	4.3	5.0	7.3	1.7	1.3	4.7	24.3	0.0	15.38	139,845	29.3
Pr>Treat			<0.001	0.634	0.037	0.103	0.149	0.002	0.003	0.006	<0.001	0.108	0.087
$LSD_{0.05}$			1.4	NS	4.2	NS	NS	1.7	8.4	2.6	2.5	NS	NS

Table 6. Carrot Trial: Weed, phytotoxicity ratings and fresh biomass evaluations

Treatments	Material/A	August 19		September 10							
		Weed Rate[1]	Phyto[2]	Weed Rate[1]	Phyto[2]	Whole Plant wt (grams)	Root wt (grams)	% Root	% Foliage	Plants/A	Root ton/A
Dual Magnum	0.67 pint	3.7	1.0	8.3	0.0	25.1	9.5	37.4	62.6	527,419	5.1
Dual Magnum	1.00 pint	4.3	1.3	9.0	0.0	23.1	8.3	36.0	64.0	389,587	3.5
Dual Magnum	1.33 pint	6.3	2.0	9.2	0.3	22.1	8.2	36.8	63.2	466,693	4.1
Dual Magnum	1.67 pint	7.7	2.7	9.2	0.7	25.7	10.5	40.4	59.6	464,388	5.0
Outlook	7.0 ounces	7.7	2.7	9.0	3.0	20.4	6.8	33.2	66.8	525,401	4.1
Outlook	14.0 ounces	7.7	3.3	8.8	4.7	20.6	7.8	37.8	62.2	509,593	4.4
Untreated	----	0.0	0.0	0.0	0.0	33.9	15.6	45.7	54.3	336,832	5.6
Pr>Treat		0.002	<0.001	<0.001	<0.001	0.057	0.016	0.002	0.002	0.385	0.315
$LSD_{0.05}$		3.4	1.0	0.7	1.6	NS	4.4	4.7	4.7	NS	NS

1 – Weed rating scale: 0 = no weed control to 10 = complete weed control; 2 – phytotoxicity scale: 0 = no crop damage to 10 crop dead.

INVESTING FOR FARM FAMILIES

After nearly two years in development, the Investing for Farm Families online course is ready for participant enrollment.
"You can learn to secure your farm's future and protect your family's legacy by enrolling now in an online course just for farm families," said Barbara O'Neill, Extension specialist in Financial Resource Management at Rutgers Cooperative Extension. "Investing for Farm Families provides the information you need to make strategic decisions while weaving together farm and personal investments."

The 8-lesson course helps farm families plan for a financially stable future that meets their long-term needs. Developed by a team of Extension educators from several states, farm families can work at their own pace while taking the course.

Surveys and focus groups with farmers provided the course developers with insights about farmers' investment concerns and learning preferences.

"The primary benefit of the course is the thoughtful analysis of how on- and off-farm investments can be balanced based on the participant's unique situation," Eggers said. "Farm and ranch families tend to be more comfortable with the investments they can see and use. Investing for Farm Families can help farmers to diversify their investments."

O'Neill along with several Extension staff from around the nation developed the course through the Online Investment Education (OIE) project, which was created to reach farm families nationwide with investment information relevant to their needs.

For more information or to enroll in the course, go to www.extension.org/pages/InvestingforFarmFamilies

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