Imperial County Agricultural Briefs

Features **From your Farm Advisors**

November, 2009

Thrips Management in Lettuce


Eric T. Natwick and Martin I. Lopez

Western flower thrips, *Frankliniella occidentalis* (Pergande), is a common lettuce pest in California; growers can suffer serious economic losses. Although efficacious insecticides are registered for thrips control on both types of lettuce, there is always a need for new efficacious insecticidal chemicals with novel modes of action. New chemistries are needed to help maintain insecticide susceptibility in western flower thrips, a species with a history of insecticide resistance development. Two trials were conducted to evaluate the efficacy of commercial and experimental insecticides for thrips control on iceberg lettuce (var. Eblin) and romaine lettuce (var. Fresh Heart) at the University of California Desert Research and Extension Center. Both lettuce crops were planted during the first week of November 2008 and each experiment used randomized complete block design with four replicates. Treatment lists and insecticide application dates are listed in Table 1. In-furrow planting time injections were applied two inches below the seed in 26 gpa of water. Banded drench treatments were applied at 12 gpa (30 psi) and foliar sprays were applied with a tractor mounted spray boom with 3 nozzles (TJ-60103VS) per bed at 57 gpa (36 psi).

Evaluations:
Iceberg lettuce evaluations were conducted on 12, 26, 30 January; 5, 12 and 19 February 2009 and for romaine lettuce on 13, 27, 30 January; 5, 12, and 23 February 2009. During each evaluation, 5 lettuce plants were examined and the number of western flower thrips found was recorded (Tables 2 and 3).

Harvest data were collected from 13.1 row feet of each plot (0.001 acre) and for each experiment on 19 February for iceberg lettuce and on 23 February for romaine lettuce. The numbers of marketable naked iceberg lettuce heads and the numbers of romaine hearts were recorded, as well as the number of culls caused by extensive thrips damage for both the iceberg lettuce and romaine lettuce experiments. The total numbers and weight of marketable heads was recorded for each experiment. The percent of heads considered marketable due to lack of thrips damage was also determined for each experiment (Tables 3 and 4).

Statistical analysis:
Raw data for each experiment were analyzed using ANOVA. Differences among means on each sampling date and in each experiment were determined using Least Significant Difference Test (P=0.05). Log_{10} (X+1) transformations were used, as needed, with back-transformed means presented in tables.

Results and Discussion:
All of the test products were effective in significantly reducing (P=0.05) populations of western flower thrips, compared to the untreated check plots for both the iceberg and romaine lettuce experiments on at least some of the sampling dates (Tables 2 and 3). In the iceberg lettuce experiment, the Vemon followed by Mustang treatment and the Radiant treatment were the most efficacious. The HGW86 10 SE treatment was the least efficacious with significantly more thrips than the aforementioned treatments for the over all experiment average (Table 2). In the romaine experiment, the tank mix of Success + Ecozin Plus treatment was the most efficacious and Durivo was the least efficacious treatment with significantly more thrips than Success + Ecozin Plus for the overall experiment average (Table 3).

All insecticide treatments had more market quality heads, higher percentages of marketable heads and fewer thrips damaged heads than the check plots for both the iceberg and romaine lettuce experiments (Tables 4 and 5). In the iceberg lettuce experiment, the Radiant treatment and Success followed by Requiem treatment had the highest yields as kg of marketable heads, significantly more than the Durivo treatment and the Vemon followed by Mustang treatment (Table 4). In the romaine experiment, the Orthene 97 + Ecozin Plus treatment and plots treated with Rimon 0.83 EC followed by Radiant had the highest percentages of market quality heads, but there were no differences among the treatments for numbers of marketable heads or weight of market heads (Table 5).

Not surprisingly, treatment that included Radiant, Success, Mustang or Lannate performed well against western flower thrips as they have in earlier experiments in 2005 and 2006 and are used as industry standards. The treatment of Ecozin Plus followed by Requiem looks promising for thrips control in lettuce. Durivo and HGW86 10 SE may also become useful thrips control insecticides for lettuce growers. HGW86 is cyazypyr, an experimental compound under development by DuPont and was not registered for this use at the time of publication.

Table 1. Treatment Lists for Thrips Control in Iceberg Lettuce and Romaine Lettuce, 2008/09.

Iceberg Lettuce			Romaine Lettuce		
Treatment	**Oz/acre**	**Treatment date**	**Treatment**	**Oz/acre**	**Treatment date**
Untreated Check	--------	--------------------	Untreated Check	--------	--------------------
Venom 20 SG* f/b Mustang	20.0 f/b 3.4	3 Nov 23, 30 Jan, 6 Feb	Venom 20 SG* f/b Mustang f/b Lannate LV	20.0 f/b 3.4 f/b 24.0	3 Nov 23 Jan, 6 Feb 30 Jan
Ecozin Plus*** f/b Requiem	15.0 f/b 64.0	23 Jan, 6 Feb 30 Jan	Success + Ecozin Plus***	10.0 + 12.0	23, 30 Jan, 6 Feb
Lannate LV	24.0	23, 30 Jan, 6 Feb	Radiant	7.0	23, 30 Jan, 6 Feb
Success f/b Requiem	10.0 f/b 64.0	23 Jan, 6 Feb 30 Jan	Lannate LV f/b Radiant	24.0 f/b 7.0	23, 30 Jan, 6 Feb
Radiant	7.0	23, 30 Jan, 6 Feb	Orthene 97 + Ecozin Plus****	24.0 + 12.0	23, 30 Jan, 6 Feb
Success f/b Lannate LV	10.0 f/b 24.0	23 Jan, 6 Feb 30 Jan	Rimon 0.83 EC f/b Radiant	12.0 f/b 7.0	23 Jan, 6 Feb 30 Jan
Durivo**[1]	13.0	13 Jan	Durivo**	13.0	13 Jan
HGW86 10 SE[2]	13.4	23, 30 Jan, 6 Feb	HGW86 10 SE	13.4	23, 30 Jan, 6 Feb

*At Plant soil injection. **Band drench at base of plants. ***Buffered to pH 7.0. ****Buffered to pH 5.5. MSO @ 0.25% v/v added to each foliar spray mixture. [1] This application method is not consistent with the Cal DPR label directions at time of publication. [2] Not registered for this use at the time of publication.

Table 2. All Stages of Western Flower Thrips per Five Plants in Iceberg Lettuce, 2008/09.

Treatment	Oz/acre	12 Jan	26 Jan	30 Jan	5 Feb	12 Feb	19 Feb[z]	Average
Check	--------	89.25	89.25 a	185.00 a	44.00 a	47.25 a	26.09 a	80.25 a
Venom 20 SG f/b Mustang	20.0 f/b 3.4	61.75	20.75 b	46.50 d	12.50 bc	11.00 b	1.21 c	25.75 d
Ecozin Plus f/b Requiem	15.0 f/b 64.0	82.75	26.75 b	48.50 d	7.50 c	9.50 b	4.18 bc	30.00 cd
Lannate LV	24.0	67.25	30.75 b	48.75 d	16.00 bc	7.75 b	4.14 bc	29.13 cd
Success f/b Requiem	10.0 f/b 64.0	57.75	35.25 b	70.00 d	14.75 bc	13.25 b	2.98 bc	32.38 c
Radiant	7.0	51.75	32.00 b	48.50 d	13.75 bc	6.75 b	2.22 bc	25.96 d
Success f/b Lannate LV	10.0 f/b 24.0	82.00	35.25 b	106.25 c	18.00 b	11.25 b	4.38 bc	43.71 c
Durivo	13.0	67.25	38.50 b	57.75 d	17.25 bc	10.75 b	3.56 bc	32.58 c
HGW86 10SE[1]	13.4	83.00	33.25 b	137.50 b	16.75 bc	14.25 b	6.86 b	48.67 b

Means within columns followed by the same letter are not significantly different; LSD, *P*=0.05.
[z] Log transformed data used for analysis; back transformed means shown in the table. [1] Not registered for this use at the time of publication.

Table 3. All Stages of Western Flower Thrips per Five Plants in Romaine Lettuce, 2008/09.

Treatment	Oz/acre	13 Jan	27 Jan	30 Jan	5 Feb	12 Feb	23 Feb	Average
Check	--------	36.50	44.75 a	53.50 a	46.00 a	44.25 a	232.25 a	76.21 a
Venom 20 SG f/b Mustang f/b Lannate LV	20.0 f/b 3.4 f/b 24.0	21.75	10.75 b	16.00 bc	12.75 bc	10.25 b	68.50 b	23.33 bc
Success + Ecozin Plus	10.0 + 12.0	26.75	12.50 b	17.50 bc	5.252 c	10.50 b	26.00 c	16.42 c
Radiant	7.0	31.25	10.50 b	25.25 b	14.75 bc	9.50 b	44.50 bc	22.63 bc
Lannate LV f/b Radiant	24.0 f/b 7.0	25.00	15.75 b	20.00 bc	15.75 bc	6.00 b	48.25 bc	21.79 bc
Orthene 97 + Ecozin Plus	24.0 + 12.0	35.00	19.00 b	15.25 c	12.25 bc	10.00 b	31.75 c	20.54 bc
Rimon 0.83 EC f/b Radiant	12.0 f/b 7.0	33.50	12.75 b	17.50 bc	16.25 bc	7.50 b	46.75 bc	22.38 bc
Durivo	13.0	33.00	10.75 b	22.00 bc	28.50 b	16.25 b	42.50 bc	25.50 b
HGW86 10SE[1]	13.4	33.50	11.75 b	23.25 bc	18.25 bc	11.00 b	38.50 bc	22.71 bc

Means within columns followed by the same letter are not significantly different; LSD, *P*=0.05. [1] Not registered for this use at the time of publication.

Table 4. Numbers of Thrips Damaged Heads, Market Heads, and kg of Market Heads per 0.001 acre, and

Percentages of Market Heads for Iceberg Lettuce, 2008/09.

Treatment	Oz/acre	Thrips damage	Market heads	Kg market heads	% Market heads
Check	--------	10.00 a	17.75 d	12.04 c	64.51 d
Venom 20 SG f/b Mustang	20.0 f/b 3.4	7.75 a	19.25 cd	13.03 c	72.06 cd
Ecozin Plus f/b Requiem	15.0 f/b 64.0	6.00 ab	21.50 bcd	15.29 abc	78.61 bc
Lannate LV	24.0	6.50 ab	22.50 abc	14.67 abc	77.56 bcd
Success f/b Requiem	10.0 f/b 64.0	1.75 c	25.25 ab	17.78 a	93.26 a
Radiant	7.0	2.50 bc	25.25 ab	17.99 a	91.03 ab
Success f/b Lannate LV	10.0 f/b 24.0	0.75 c	26.25 a	16.99 ab	97.25 a
Durivo	13.0	7.50 a	19.75 cd	13.94 bc	72.74 cd
HGW86 10SE[1]	13.4	3.25 bc	23.50 abc	14.90 abc	88.01 ab

Means within columns followed by the same letter are not significantly different; LSD, *P*=0.05. [1] Not registered for this use at the time of publication.

Table 5. Numbers of Thrips Damaged Heads, Market Heads, and kg of Market Heads per 0.001 acre, and Percentages of Market Heads for Romaine Lettuce, 2008/09.

Treatment	Oz/acre	Thrips damage	Market heads	Kg market heads	% Market heads
Check	--------	10.75 a	15.75 b	7.38	59.34 d
Venom 20 SG f/b Mustang f/b Lannate LV	20.0 f/b 3.4 f/b 24.0	5.25 bc	21.00 a	8.68	80.21 bc
Success + Ecozin Plus	10.0 + 12.0	4.00 cd	23.50 a	10.37	86.58 ab
Radiant	7.0	5.00 bc	21.50 a	9.71	80.92 bc
Lannate LV f/b Radiant	24.0 f/b 7.0	3.00 cd	22.50 a	10.78	88.09 ab
Orthene 97 + Ecozin Plus	24.0 + 12.0	1.25 d	23.25 a	11.13	94.80 a
Rimon 0.83 EC f/b Radiant	12.0 f/b 7.0	4.75 bc	22.25 a	9.55	82.56 bc
Durivo	13.0	8.00 ab	21.50 a	7.85	72.91 c
HGW86 10SE[1]	13.4	2.75 cd	23.00 a	9.58	89.40 ab

Means within columns followed by the same letter are not significantly different; LSD, *P*=0.05. [1] Not registered for this use at the time of publication.

All insecticide treatments were effective in reducing western flower thrips populations compared to the untreated check plots in both experiments. Standard insecticides (Success, Radiant, Lannate, and Mustang) were among the best thrips control treatments. Ecozin Plus when used in combination with Success or Orthene was also efficacious against western flower thrips. These products are important because they represent four different Insecticide Resistance Action Committee (IRAC) chemical class modes of action. They can be used in rotation to help maintain western flower thrips susceptibility in California. Radiant and Success are Spinosyns (Group 5), nicotinic acetylcholine receptor agonists. Lannate is a carbamate (Group 1A) and Orthene is an organophosphate (Group 1B), both are acetylcholine inhibitor. Mustang in a pytethroid (Group 3) is a sodium channel modulator and Ecozin Plus is azadirachtin (Group UN) an ecdysone agonist molting disruptor. Venom is in yet another IRAC mode of action chemical class, the neonicotinoids (Group 4A) that are nicotinic acetylcholine agonist/antagonists. The nionicotinoids were investigated for efficacy against thrips in previous studies funded by the California Lettuce Research Board and were found to lack the residual activity when applied at planting to protect lettuce when thrips are of the most concern, nearer to harvest. Durivo is an in-the-can mixture of thiamethoxam (neonicotinoid) and chlorantraniliprole, a diamide (Group 28) a ryanodine receptor modulator. HGW86 is cyazypyr, also a (Group 28) diamide but was applied as multiple foliar applications. Requiem is in the Chemical Class: Terpenoid and works on the exoskeleton and the respiratory system interfering with chemoreception confusing insects' navigation systems resulting in repellency, reduced egg laying, and reduced probing.

Durivo was applied as a basal band drench on 13 Jan, 10 weeks after planting, and there was thrips control, but the thrips damage at harvest was greater than all other treatments except the untreated check. Durivo may be useful as a basal drench (however this use is not consistent with the California DPR label directions at the time of this publication), but another insecticide applied closer to harvest would be needed to prevent economically important damage. Based on numbers and percentages of market heads, the best treatments for preventing thrips damage were Success followed by Lannate LV, Success followed by Requiem, and Radiant in iceberg lettuce and Orthene 97 + Ecozin Plus, HGW86 10 SE, Lannate LV followed by Radiant, and Success + Ecozin Plus in romaine lettuce.

IRRIGATION SCHEDULING - DRIP IRRIGATION SYSTEMS

Khaled M. Bali

How much water are you applying with your drip irrigation system? To estimate the average depth of application, you need to figure out the amount of water applied from a flow meter, irrigation time and the area irrigated. Flow units are usually expressed in gallons per minute (gpm). To estimate the average depth of applied water, you need to take the average flow rate during the irrigation. The average depth of application can be determined from:

$$D= (Q*T)/(A* 449)$$

Where D is the average depth of applied water in inches, Q is the flow rate in gpm, T is irrigation time, A is the net area being irrigated in acres and 449 is a conversion factor when using gallons per acre.

Example: How much water was applied to a 37 acre field (tip: use the net area being irrigated and not the gross area) using an average flow rate of 2200 gallons per minute and the field was irrigated for 4 hours?

D= (2200*4)/(37*449)= 0.53 inches

If the flow rate reading is in units other than gpm, the average depth of application can be determine using the same principle but a different conversion factor.

If the meter gives you a total volume applied, just figure out the difference between the meter reading at the beginning of the irrigation event and the reading at the end of the irrigation event and use the following equation:

D=(V2-V1)*12/A

Where D is the average depth of applied water in inches, V1 is the meter reading at the beginning of the irrigation (ac-ft), V2 is the meter reading at the end of the irrigation event (ac-ft), A is net irrigated area in acres and 12 is a conversion factor. The length of the irrigation event is not needed here because we know the net volume applied.

Example: How much water was applied to a 37 acre (tip: use the net area being irrigated and not the gross area)? The volume reading at the beginning of the irrigation event was 120.00 ac-ft and the reading at the end of irrigation was 121.63 ac-ft.
D= (121.63-120.00)*12/37= 0.53 inches

Once the net depth of application is calculated, the irrigation frequency can be calculated from the net depth of application and the daily consumptive water use. An estimate of irrigation efficiency is needed (80-90% for a well-managed drip irrigation system). If the daily consumptive water use is 0.10 inches per day then the next irrigation need to be applied in about 5 days if you could achieve 100% irrigation efficiency.

0.53 inches/ 0.10 inches per day= 5 day, if you figure the irrigation efficiency then the next irrigation would be in about 4 days (assuming 80% irrigation efficiency)

0.53 *0.8/0.1= 4 days

The above calculations will give you an estimate of the amount of water applied and the irrigation frequency. Installing soil moisture measuring devices in the field will provide more guidance and provide assurance that the above calculations are reliable. Keep in mind that the crop water requirements are not constant during the growing season. Estimates of daily crop water requirements could be made from ETo and crop coefficients. Please feel free to call or email if you need more information about this topic.

Conversion factors:

1 acre = 43560 ft^2

1 ft^3 = 7.48 gallons

1 gallon = 3.785 liters

1 cfs = 449 gpm

24 Hour-Run: 1 cfs ::: 2 Ac-ft per 24 hr.

12 Hour-Run: 1 cfs ::: 1 Ac-ft per 12 hr.

Downy Mildew of Lettuce

Donna Henderson

Downy mildew of lettuce is caused by *Bremia lactucae,* a fungal-like organism (oomycete) and obligate pathogen of lettuce (*Latuca sativa*), but has also been reported to infect other plants such as artichoke (*Cynara cardunculus*), cornflower (*Centaurea cyanus*), and strawflower (*Helichrysum bracteatum*) (UCIPM). However, pathotypes of the pathogen that are found infecting lettuce are highly specialized and will likely only infect the primary host, cultivated lettuce.

Downy mildew disease is more likely to occur in humid, moist, relatively cool environments. Intuitively, it would seem that downy mildew infection is unlikely to occur in a desert climate; however, periods of rain, sprinkler irrigation, and cool periods in the evening and early morning can create optimal conditions. Moreover, microclimates can be created in cultivated lettuce, creating humid and moist conditions when the lettuce foliage forms a dense canopy. During periods of cool weather, conditions become favorable for disease development within lettuce stands. Symptoms of downy mildew on lettuce are light green to yellow angular spots on the upper surfaces of older leaves, which eventually dry up and turn brown (UCIPM). Underneath these spots the fungus develops a white fluffy growth that is spore-producing (UCIPM). Although a rare occurrence, dark discoloration and streaking of internal vascular and pith tissues may become evident if the initial infection becomes systemic. Spread of the pathogen in the field is through spore dispersal in the wind. Sporangia become airborne and are blown from the leaf spots to new plants. The sporangia will germinate during periods of leaf wetness, infecting the plant cells and creating new sporangia on the underside of the leaves at night. The sporangia are released into the air in the morning provided there is high relative humidity. The sporangia that land on new leaves will infect the tissues at temperatures of 40˚F to 86 ˚F; optimum infection temperatures are 50˚F to 68˚F. Although *B. lactucae* also produces overwintering oospores that survive in crop debris in locations such as Europe, this has not been confirmed to occur in California.

The most effective management technique is planting resistant cultivars (UC-IPM). However, it is important to sample and test to find out which pathotypes are infecting the lettuce. This information will be useful for planting cultivars with resistance to the prevalent pathotype of *B. lactucae*. Fungicides should be used as protectant, preventative sprays and can be applied in multiple applications in a rotation. Fungicide applications should be made prior to symptom development when conditions are favorable for disease. Available fungicides include: Acrobat, Aliette, Blockade, Fosphite, Maneb, Presidio, Previcur Flex, Reason, Revus, Ridomil Gold, and Tanos. Caution should be taken when using Ridomil fungicide (metalaxyl), as many isolates in California have developed resistance; additionally, several *B. lactucae* isolates have become partially resistant to Aliette (fosetyl-Al). Presidio and Revus are recently registered chemicals that have shown efficacy against downy mildew in research trials and should be considered as part of the fungicide rotation. Prior to using any fungicide, please check with the Agricultural Commissioner's office and product labels for instructions and use restrictions.

Building Healthy Soil

Mark A. Trent

An agricultural field or area can be thought of as an ecosystem (agroecosystem). An ecosystem is: A natural unit consisting of all plants, animals and micro-organisms (biotic factors) in an area functioning together with all of the physical (abiotic) factors of the environment. An ecosystem is a unit of interdependent organisms which share the same habitat. In a farm field the plants may include the crop plants and weeds. Animals include beneficial and pest insects (foliar and soil) as well as larger animals like birds and rodents. Micro-organisms may also be beneficial or pests. Physical factors include; soil particles, minerals, air, and water. When all these factors are in a functional balance we have a healthy agroecosystem. Unlike a natural ecosystem where the forces of nature work to balance the system, an agroecosystem is a managed system. A properly balanced agroecosystem can reduce inputs and increase yields. Perhaps the best way to improve the balance of your system is to build healthy soil. Healthy soils are populated with a diversity of microorganisms including bacteria, fungi, nematodes, and actinomycetes (A group of microorganisms apparently intermediate between bacteria and fungi) as well as insects and worms. Most of these organisms are soil inhabitants and live a comfortable life feeding on organic matter and breaking it down into nutrients that can be used by the plants and building soil structure. However, when food sources are limited, so are these beneficial organisms. Our desert soils are limited in natural food sources (organic matter) for these creatures by the nature of the soil formation and the desert environment in which the soils developed.

The central dogma for healthy soil:

Organic residues —Decay organisms→ Humus → Money

Raw organic residues consist of waste products or dead organisms that have not decomposed. Humus is organic matter that has undergone some degree of decomposition.

Healthy soil and humus go hand-in-hand: health is the strength of the soil's living population and humus is the result of the activities of the organisms. Humus is the foundation of the soil ecosystem. By building soil humus you are building the soils physical and chemical properties plus its biological diversity and vitality.

Humus is a dark brown, porous, spongy and somewhat gummy material. It is a mixture of plant residues that don't readily decompose and gums and starches that are a byproduct of soil organisms that consume organic debris. Humus is highly variable in its composition, depending on the nature of the original material and the conditions of its decomposition. The component of humus that can still be decomposed readily is known as "active" humus. This type of humus is an excellent source of plant nutrients. The nutrients are released as soil organisms continue to decompose the organic matter, but active humus has little influence on soil structure and long-term tilth. The other component is called "stable" humus and is highly insoluble and may be tightly bound

to clay particles, resisting penetration by microbes. This type of humus resists decomposition and does little to add nutrients to the soil ecosystem, but it is essential to improving the soil's physical qualities. Stable humus originates from woodier plant residues which contain lots of cellulose and lignin.

Benefits of Humus

• Humus can hold the equivalent of 80 to 90 percent of its weight in water, so soil rich in humus may be more drought-resistant.

• Humus is light and fluffy, allowing air to circulate easily.

• The sticky gum secreted by microbes while forming humus helps hold soil particles together, improving tilth.

• Mineral nutrients made available through humus are in a form readily available to plants and are resistant to leaching away in rain or irrigation water.

• Humus can act as a buffer due to its biochemical structure to moderate excessive acid or alkaline conditions in the soil.

• Some toxic heavy metals can be immobilized by soil humus, reducing uptake by the plants or other soil organisms.

• Humus is usually a dark brown or black color, which may aid in warming of cold soils.

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THE 20th ANNUAL FALL DESERT CROPS WORKSHOP

December 1, 2009
Brawley Event Center
1562 Main Street Brawley, CA

New Venue for the Annual Fall Desert Crops Workshop

Mark your calendars for the upcoming **20th Annual Fall Desert Crops Workshops**. This year's meeting will be take place at the Brawley Event Center located at 1562 Main Street in Brawley on December 1st. A great line up of speakers have been scheduled including representatives for your local UC Cooperative Extension, UA Yuma Extension, USDA-ARS scientists, as well as Extension specialists from the University of California and Arizona. Continuing education credits for California and Arizona as well as CCA credits will be available. So come out and join us for this educational opportunity. Lunch will be provided courtesy of the Western Farm Press. Please RSVP for lunch by October 28th by mail using the Registration Form at the end of the agenda or by email to atietz@ucdavis.edu.

Agenda

7:30 **Registration**

7:45 **Welcome from Western Farm Press** – Cary Blake, Associate Editor, Western Farm Press, Gilbert, AZ;

7:50 **Update on E. coli and other human pathogens concerning Leafy Vegetable producers** – Mark Trent, Vegetable Crops Advisor, UC Cooperative Extension Imperial County, UC Desert and Extension Center, Holtville;

8:10 **Vegetable insect management -** Eric Natwick, Entomology Farm Advisor, UC Desert and Extension Center, Holtville;

8:30 **Using RF ID and GPS Technology for Lettuce Carton Trace Back** – Kurt Nolte – UA Area Extension Agent and Director, Yuma County, Ariz.;

8:50 **Importance of Nematode Sampling** – Donna Henderson, UC Cooperative Extension Imperial County, UC Desert and Extension Center, Holtville;

9:10 **Nitrogen Management for Vegetable Crops** – Charles Sanchez, Soil Scientist, UA Yuma Agricultural Center Director, Yuma County, Ariz.;

9:30 **Lettuce Irrigation Management** – Khaled Bali, Irrigation/Water Management Advisor, UC Cooperative Extension Imperial County, UC Desert and Extension Center, Holtville;

9:50 **Break**

10:05 **The Legend of El Dorado, Biochar, Carbon Sequestration, and How All This Affects Soil-Applied Pesticides** - Milton McGiffen Jr., UC Cooperative Extension Specialist, Plant Physiologist, Riverside, Calif.;

10:25 **Nematode Management** – Antoon Ploeg, Nematology Specialist, UC Riverside;

10:45 **Melon Virus Disease Management** – Maria Rojas, Plant Pathologist, UC Davis;

11:05 **Expanded Host Range of *Cucurbit yellow stunting disorder virus*: Implications for Management** – William Wintermantel, Plant Pathologist, USDA ARS, Salinas, CA;

11:25 **Breeding Melons for Resistance Powdery Mildew and Cucurbit Yellow Stunting Disorder** – James McCreight, USDA ARS, Salinas, CA;

11:45 **Pesticide Industry Updates** – To be announced

12:10 **Lunch** - provided at no charge for those who RSVP by Oct. 28 – courtesy of Western Farm Press and commercial suppliers.

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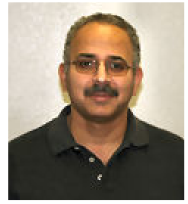
REGISTRATION FORM
20th Annual Fall Desert Crops Workshop
December 1, 2009

Name ____

Business ____

Number Attending: __________

Please e-mail atietz@ucdavis.edu , fax to 760-352-0846, or return this form to:
Workshop, 1050 Holton Rd. Holtville, CA



CIMIS REPORT AND UC DROUGHT MANAGEMENT PUBLICATIONS

Khaled Bali and Steve Burch*

California Irrigation Management Information System (CIMIS) is a statewide network operated by California Department of Water Resources. Estimates of the daily reference evapotranspiration (ET_o) for the period of October 1 to December 31 for three locations in the Imperial County are presented in Table 1. ET of a particular crop can be estimated by multiplying ET_o by crop coefficients. For more information about ET and crop coefficients, contact the UC Imperial County Cooperative Extension Office (352-9474) or the IID, Irrigation Management Unit (339-9082). Please feel free to call us if you need additional weather information, or check the latest weather data on the worldwide web (visit http://tmdl.ucdavis.edu and click on the CIMIS link).

Table 1. Estimates of daily Evapotranspiration (ET_o) in inches per day

Station	November		December		January	
	1-15	16-30	1-15	15-31	1-15	16-31
Calipatria	0.14	0.10	0.07	0.07	0.08	0.09
El Centro (Seeley)	0.13	0.09	0.06	0.06	0.08	0.09
Holtville (Meloland)	0.13	0.10	0.06	0.06	0.08	0.09

* Irrigation Management Unit, Imperial Irrigation District.

Link to UC Drought Management Publications

http://ucmanagedrought.ucdavis.edu/