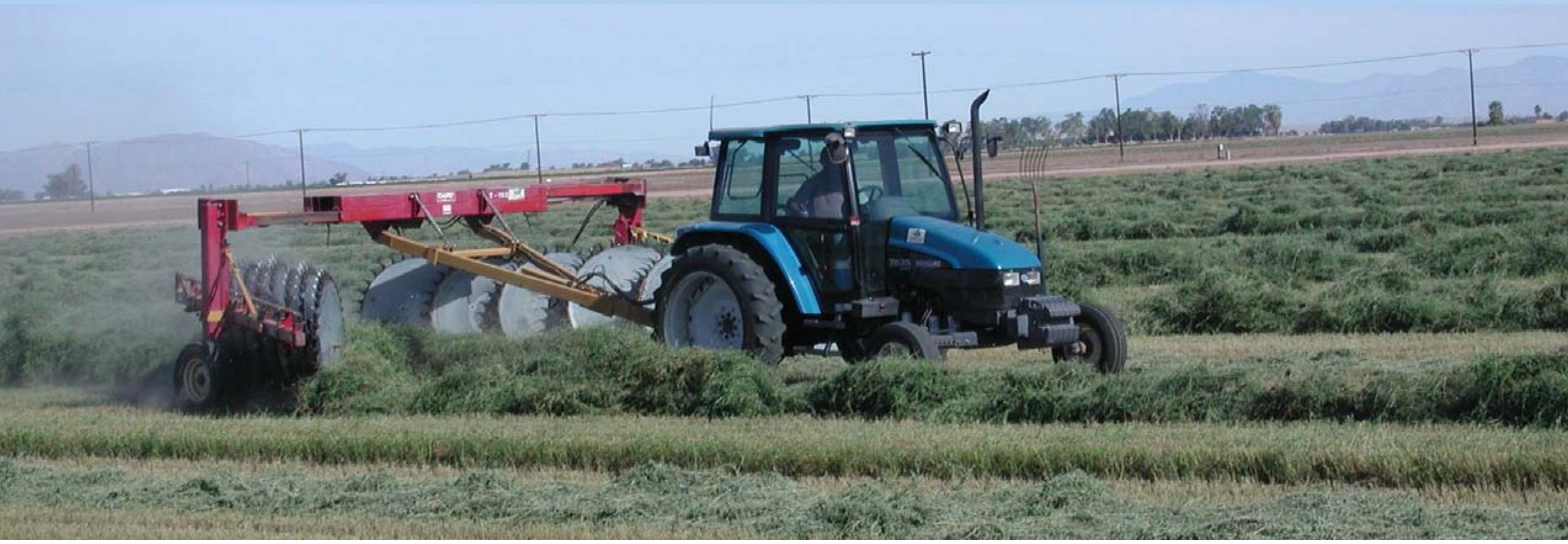
Imperial County Agricultural Briefs



Features **From your Farm Advisors**

December, 2009

Surface Irrigation Systems Efficiency Measures

Khaled M. Bali

The main objective of evaluating any irrigation system is to identify management practices that can be implemented to improve water use efficiency. Evaluating the performance of a surface irrigation system is often tedious and time consuming. Irrigation efficiency can be evaluated by several performance measures such as application efficiency (AE), application uniformity or distribution uniformity (DU), deep percolation ratio (DPR), and runoff ratio (ROR). The formulas that are commonly used to evaluate the efficiency of an irrigation system are defined below:

Water-Conveyance Efficiency (Ec)

Ec= 100*Wd/Wi

where Wd is water delivered by a distribution system and Wi is water introduced into the distribution system. Example of water losses: seepage and evaporation.

On-farm Efficiency Measures:

Application Efficiency (AE)

AE=(Average depth of water added to the root zone)/(Average depth of applied water)

Distribution Uniformity (DU)

DU=(Average volume (or depth) of water stored in the lowest quarter of the field)/(Average volume (or depth) stored in soil profile)

Deep Percolation Ratio (DPR) and Runoff Ratio (ROR)

DPR=(Volume (or depth) of deep percolation)/(Volume (or depth) of applied water)

ROR=(Volume (or depth) of runoff)/(Volume (or depth) of applied water)

AE+DPR+ROR=100%

Irrigation Water Requirements (IR)

IR= Crop ET/AE

Example 1:

If an average of 5 inches of water were applied to a field and if we assume 4 inches of water were stored in the root zone (based on crop water requirements for that period), any amount of water in excess of 4 inches is lost to deep percolation and/or runoff.

AE = 4/5 = 80%

Managing Bottom Rot of Winter Lettuce

Donna R. Henderson

Bottom rot is a prevalent fungal disease that is problematic for winter lettuce growers. Bottom rot can be managed through a combination of field history (disease and previous crop), and fungicides. Following some guidelines for management of these diseases may save the grower significant costs.

Bottom rot of lettuce is caused by *Rhizoctonia solani*. This fungus is soil-borne and widely prevalent in the soil. *R. solani* is considered competitive, because it has the unique ability to survive for long periods on soil organic matter. Soil organic matter is present in-between cropping cycles, enabling the survival of the fungus for potential infection of the following crop of lettuce. The fungus is spread to new locations through movement of soil, and can be transported through infected plant parts that have developed fungal sclerotia. Sclerotia are the fruiting bodies of the fungus, where sexual recombination has occurred. Sclerotia will germinate in moist soil, infecting lettuce leaves in contact with the soil. The fungus is able to enter the plant through open wounds, or through the stomata. The optimal temperatures for mycelial growth is a wide range between 41°F and 96°F, representative of winter temperatures in the desert valley.

Symptoms of Bottom rot are not readily apparent in the mature heads of lettuce in arid desert climates, symptoms are seen after the head is cut. Infected plants exhibit sunken, reddish-brown lesions on midribs and leaf petioles that touch the soil. The lesions will become overgrown by white to brownish mycelium (fungal threads), eventually moving upwards until the entire head is covered. Symptomatic leaves are often abandoned in the field, leaving fungal inoculum for subsequent crops. Heads that are salvaged, but have fungal infection may develop secondary diseases such as bacterial rot, leading to increased losses.

Management of the disease should be multi-tiered, including knowing the field history of disease, and awareness of other crops that support *R. solani* growth, and a plan to treat fields with a known history of *R. solani* disease. *R. solani* is also known for its role in damping off; fields with known histories of damping off should be avoided, or preventatively treat this lettuce with fungicides. Fungicides are an important tool in Bottom rot management, and should be applied to the base of plants after thinning (approximately 19 days after planting) and again 7 days later. There are several fungicides found to be effective against the Bottom rot pathogen (Koike, 2005). Management of the disease should be multi-tiered, including knowing the field history of disease, and awareness of other crops that support *R. solani* growth, and a plan to treat fields with a known history of *R. solani* disease. *R. solani* is also known for its role in damping off; fields with known histories of damping off should take caution, and preventatively treat this lettuce with fungicides. *R. solani* is also known to grow well on alfalfa, so rotating lettuce after alfalfa isn't advisable. Fungicides are an important

tool in Bottom rot management, and should be applied to the base of plants after thinning (approximately 19 days after planting) and again 7 days later. There are several fungicides found to be effective against the Bottom rot pathogen (Koike, 2005). The most effective fungicides tested in both trial years were Quadris Flowable (15.4 fl oz.), Pristine (1.58lb), Flint (3oz), Rovral 4F (2 pt), and Switch (62.5WG 14oz) (Koike, 2005). Results of the trial are presented below, attention should be paid to the disease severity; lower numbers indicate higher levels of disease control by the fungicides (Table 1). The means followed by the same letters are not significantly different.

Table 1. *Excerpt from Fungicide and Nematicide Tests 60:V150 (2005)

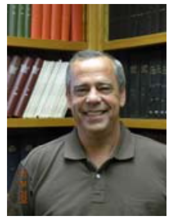
Treatments and Rate/Acre	Mean disease severity* 2001	2002
Quadris Flowable 15.4 fl oz	2.95 a	0.75 a
Pristine 1.58 lb	2.96 ab	0.77 a
Flint 3 oz	2.96 ab	0.97 a
Rovral 4F 2 pt	2.99 ab	0.68 a
Switch 62.5WG 14 oz	3.07 abc	0.80 a
Botran 5F 3 qt	3.18 bcd	2.22 b
Elevate 50WDG 1 lb	3.23 cd	---
Ronilan 50W 2 lb	3.32 d	---
Untreated control	3.38 d	2.85 c
LSD (P = 0.05)	0.22	0.48

* Disease severity values in each column that are followed by the same letter are not

Koike, S.T., and Martin, F.N. 2005. Evaluation of fungicides for controlling bottom rot of iceberg lettuce, 2001 and 2002. Fungicide and Nematicide Tests 60:V150.

Food Safety Self Audit

Mark A. Trent

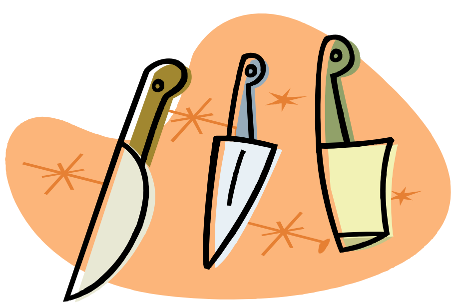


As harvest time for fresh vegetables approaches, food safety concerns may come to mind. Below is a self audit that may be beneficial for preparations for field harvest and field packing activities. The audit, developed by Penn State University Department of Food Science, allows you to compare your farm practices with nationwide food safety standards**.** Do you need to make any changes in how you run things? Complete this self inspection form based on the USDA farm food safety verification program. The complete audit can be accessed online at http://foodsafety.psu.edu/gaps/Checklist_with_Points2.pdf.

Food Safety Self Audit - Field Harvest and Field Packing Activities					
	Field Sanitation and Hygiene	**Pts**	**Yes**	**No**	**NA**
1	Do the number, condition, and placement of field sanitation units comply with applicable state and/or federal regulations?	10			
2	If field sanitation units are not used and not required by applicable state or federal regulations, are toilet facilities readily available for all workers?	15			
3	Are field sanitation units in locations that minimize the potential risk for product contamination and are they directly accessible for servicing?	10			
4	Do you have a documented response plan in place In the event of a major spill or leak of field sanitation units or toilet facilities *and* are field sanitation units or toilet facilities directly accessible to the response team?	10			
	Field Harvesting and Transportation	**Pts**	**Yes**	**No**	**NA**
5	Have you documented that all harvesting containers (including bulk hauling vehicles) that come in direct contact with product are cleaned and/or sanitized prior to use and kept as clean as practicable?	5			
6	Have you documented that all hand harvesting implements (knives, pruners, machetes, etc.) are kept as clean as practical and disinfected, if appropriate, on a scheduled basis?	5			

7	Are damaged containers properly repaired or disposed of?	5			
8	Is harvesting equipment and/or machinery which comes into contact with product in good repair?	10			
9	Are light bulbs and glass on harvesting equipment adequately protected so as not to contaminate produce or fields in the case of breakage?	10			
10	Do have documentation, such as a standard operating procedure or instructions, on what measures are to be taken in the case of glass/plastic breakage and possible contamination during harvesting operations?	5			
11	Do have documentation, such as a standard operating procedures or instructions, on what measures are to be taken in the case of product contamination by chemicals, petroleum, pesticides or other contaminating factors?	5			
12	Are measures taken during harvest to inspect for and remove foreign objects such as glass, metal, rocks, or other dangerous/toxic items?	5			
13	Are harvesting containers, totes, etc. *not* used for carrying or storing non-produce items during the harvest season and have you documented that farm workers are instructed in this policy?	5			
14	Do you have documentation that shows water applied to harvested product is potable?	10			
15	Are efforts made to remove excessive dirt and mud from product and/or containers during harvest?	5			
16	Do have documentation that shows transportation equipment used to move product from field to storage areas or processing plants and which comes into contact with product is clean and in good repair?	10			
17	Is there a documented policy that indicates that harvested product being moved from field to storage areas or processing plants is kept covered *and* has this policy been implemented?	5			

	Calculate your score for Field Harvest and Field Packing Activities **Total possible score is 130**	C1	C2	C3	C4
1	Enter your total points earned in C2				
2	Enter your total NA points scored in C4				
3	Subtract your total NA points from the total possible score to obtain your adjusted total possible score **(130 – C4)** and enter in C1				
4	Divide your total points by your adjusted total possible points and multiply by 100 **(C2/C1 X 100)** Then enter your final score at right		This is your final score for Field Harvest and Field Packing Activities		
80 points or higher is considered a passing score					



Evaluation Insecticides for Egyptian Alfalfa Weevil and Aphid Control in Alfalfa in 2009

Eric T. Natwick

A field study was conducted during the spring of 2009 at the UC Desert Research and Extension Center. A stand of alfalfa, var. CUF 101, was used for the experiment. Plots were arranged in a randomized complete block design with four replications. Six insecticide treatments were included along with an untreated control. Furadan 4F is no longer sold, but remaining supplies that growers have may be used according to label directions. Rimon is only registered under a 24C special local needs registration for alfalfa seed production and may not be used for alfalfa hay production at the time of this publication. NAI-2302 is Tolfenpyrad, an experimental insecticide product under development by Nichino America Inc. and is not yet registered for use on alfalfa. Insecticide treatments and rates are listed in Table 1. Plots measured 33.3 ft. by 50 ft. and insecticide treatments were applied on February 19, 2009, using a broadcast application with a tractor mounted boom. Egyptian alfalfa weevil larvae (EAW) and aphid populations {Blue Alfalfa Aphid (BAA), Pea Aphid (PA) and Spotted Alfalfa Aphid (SAA)} were measured in each plot with a standard 15-inch diameter insect net consisting of ten, 180^o sweeps. Plots were sampled on 13, 23, 26 February, 5 and 12 March 2009; 6-days pre-treatment (DPT), 4-days after treatment (DAT), 7-DAT, 14-DAT, and 21-DAT, respectively.

All insecticide treatments except Rimon + Dimethoate 267E had significantly fewer EAW larvae than the untreated check 3-DAT ($P = 0.05$) and Furadan 4F had significantly fewer EAW larvae than all other treatments (Table 1). All insecticide treatments except NAI-2302 15EC at 14 fl oz/acre had significantly fewer EAW larvae than the untreated check 7-DAT and again Furadan 4F had significantly fewer EAW larvae than all other treatments. All insecticide treatments had significantly fewer EAW larvae than the untreated check 14-DAT and 21-DAT.

There were no significant differences among the insecticide treatments and the untreated check for BAA, PA or SAA in the pre-treatment sample ($P = 0.05$) (Tables 2, 3 and 4). All of the insecticides had significantly fewer BAA compared to the untreated check 3-DAT, 7-DAT, 14-DAT and 21-DAT; but the Lorsban 4E treatment had the lowest BAA means and best residual activity (Table 2). All of the insecticide treatments had significantly fewer PA than the untreated check 3-DAT and 14-DAT (Table 3). All of the insecticide treatments except Rimon + Dimethoate 267E had significantly fewer PA than the untreated check 7-DAT. All of the insecticide treatments except Rimon + Dimethoate 267E and NAI-2302 15EC at 27 fl oz/acre had significantly fewer PA than the untreated check 21-DAT. All of the insecticide treatments had significantly fewer CPA than the untreated check 3-DAT and 14-DAT (Table 4). Only the Rimon + Dimethoate 267E treatment did not have significantly fewer CPA than the untreated check 7-DAT and only the NAI-2302 15EC at 27 fl oz/acre treatment did not have significantly fewer CPA than the untreated check 21-DAT.

Table 1. Egyptian Alfalfa Weevil Larvae per Sweeps, Holtville, CA, 2009.

Treatment	oz/acre	6 DPT[w]	3 DAT[xv]	7 DAT[v]	14 DAT[v]	21 DAT[v]	PTA[z]
Check	--------	4.63 b	18.95 a	29.20 a	11.02 a	7.13 a	17.74 a
Rimon + Dimethoate 267E	12.0 + 16.0	3.58 b	17.20 a	11.02 b	1.69 cd	1.69 bc	8.44 b
NAI-2302 15EC	14.0	7.88 a	8.12 b	14.49 ab	4.89 b	3.17 b	7.93 bc
NAI-2302 15EC	21.0	3.20 b	5.46 b	4.13 cd	2.02 bc	1.45 bc	3.60 d
NAI-2302 15EC	27.0	3.30 b	5.76 b	2.47 d	1.40 cd	1.09 c	2.87 de
Furadan 4F	16.0	4.23 b	0.17 c	0.38 e	0.35 d	0.58 c	0.49 e
Lorsban 4E	32.0	4.18 b	6.59 b	9.47 bc	1.63 cd	1.51 bc	5.40 cd

Means within columns followed by the same letter are not significantly different via LSD, *P*=0.05.
[v] Log transformed data used for analysis; reverse transformed means are shown.
[w] Days pre-treatment.
[x] Days after treatment.
[z] Post treatment average.

Table 2. Blue Alfalfa Aphids per Sweeps, Holtville, CA, 2009.

Treatment	oz/acre	6 DPT[w]	3 DAT[x]	7 DAT[v]	14 DAT[v]	21 DAT	PTA[z]
Check	--------	387.33	271.85 a	294.12 a	84.11 a	35.13 a	176.22 a
Rimon + Dimethoate 267E	12.0 + 16.0	356.28	68.83 b	103.71 b	32.11 b	12.55 b	60.74 b
NAI-2302 15EC	14.0	310.50	61.80 bc	53.95 bc	17.62 bc	10.65 b	38.31 bc
NAI-2302 15EC	21.0	383.93	25.23 cd	18.95 d	9.96 c	16.13 b	18.91 cd
NAI-2302 15EC	27.0	309.40	33.53 bcd	25.30 cd	19.42 bc	12.30 b	24.49 cd
Furadan 4F	16.0	362.85	11.75 d	18.50 d	8.55 c	13.83 b	14.74 cd
Lorsban 4E	32.0	292.83	10.78 d	2.63 e	1.00 d	3.00 b	4.56 d

Means within columns followed by the same letter are not significantly different via LSD, *P*=0.05.
[v] Log transformed data used for analysis; reverse transformed means are shown.
[w] Days pre-treatment.
[x] Days after treatment.
[z] Post treatment average.

Table 3. Mean Numbers[v] of Pea Aphid per Sweeps, Holtville, CA, 2009.

Treatment	oz/acre	6 DPT[w]	3 DAT[x]	7 DAT[v]	14 DAT	21 DAT	PTA[zv]
Check	--------	49.35	31.93 a	24.12 a	15.60 a	5.88 a	18.50 a
Rimon + Dimethoate 267E	12.0 + 16.0	42.10	8.98 b	11.88 ab	4.45 b	4.23 ab	7.51 b
NAI-2302 15EC	14.0	59.60	11.75 b	5.03 bc	4.13 b	2.73 bc	4.89 bc
NAI-2302 15EC	21.0	38.00	5.90 b	1.19 d	0.78 b	2.30 bc	2.39 cde
NAI-2302 15EC	27.0	58.90	6.03 b	2.16 cd	3.80 b	3.58 ab	3.79 bcd
Furadan 4F	16.0	33.50	2.03 b	1.51 d	0.43 b	2.33 bc	1.51 de
Lorsban 4E	32.0	45.08	2.20 b	0.51 d	0.23 b	0.38 c	0.78 e

Means within columns followed by the same letter are not significantly different via LSD, *P*=0.05.
[v] Log transformed data used for analysis; reverse transformed means are shown.
[w] Days pre-treatment.
[x] Days after treatment.
[z] Post treatment average.

Table 4. Cowpea Aphids per Sweeps, Holtville, CA, 2009.

Treatment	oz/acre	6 DPT[w]	3 DAT[x]	7 DAT	14 DAT[v]	21 DAT	PTA[zv]
Check	--------	100.35	114.33 a	18.63 a	3.47 a	2.58 a	32.88 a
Rimon + Dimethoate 267E	12.0 + 16.0	102.03	27.13 b	13.78 ab	1.63 b	0.68 b	22.66 b
NAI-2302 15EC	14.0	142.18	32.30 b	4.43 bc	0.74 bc	0.60 b	8.77 bc
NAI-2302 15EC	21.0	111.95	20.40 b	1.90 bc	0.70 c	0.60 b	5.61 bc
NAI-2302 15EC	27.0	147.80	19.28 b	0.85 c	0.51 c	1.28 ab	5.31 bc
Furadan 4F	16.0	141.40	17.03 b	3.85 bc	0.32 c	0.45 b	5.17 bc
Lorsban 4E	32.0	155.10	18.35 b	1.03 c	0.15 c	0.55 b	4.37 c

Means within columns followed by the same letter are not significantly different via LSD, *P*=0.05.
[v] Log transformed data used for analysis; reverse transformed means are shown.
[w] Days pre-treatment.

[x] **Days after treatment.**
[z] **Post treatment average.**

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 December 1 to February 28 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 (760-352-9474) or the IID, Irrigation Management Unit (760-339-9082). 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	December		January		February	
	1-15	16-31	1-15	15-31	1-15	16-28
Calipatria	0.07	0.07	0.08	0.09	0.12	0.14
El Centro (Seeley)	0.06	0.06	0.08	0.09	0.12	0.14
Holtville (Meloland)	0.06	0.06	0.08	0.09	0.12	0.14

Link to UC Drought Management Publications

http://ucmanagedrought.ucdavis.edu/