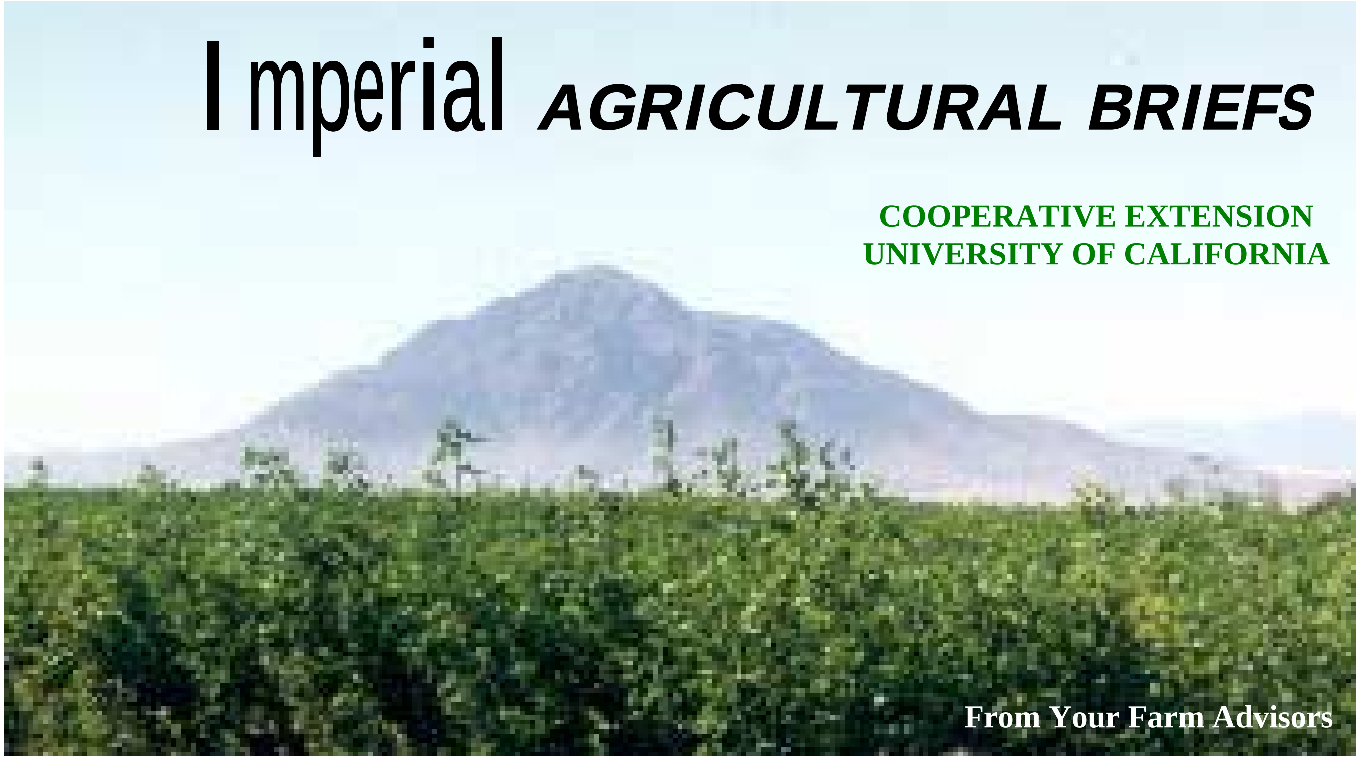

Features

***June* 2003**

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INSECTICIDE EFFICACY AGAINST BEET ARMYWORM AND ALFALFA CATERPILLAR ON ALFALFA IN 2002.

Eric T. Natwick

An insecticide efficacy study was conducted during the summer of 2002 at the UC Desert Research and Extension Center. A third year stand of the alfalfa variety CUF 101, was used for the experiment. Plots were arranged in a randomized complete block design with four replications. Eleven insecticide treatments were included along with an untreated control. Insecticide treatments and rates fluid ounces or pounds of formulated product per acre are listed in Table 1. Plots measured 35 feet by 50 feet and insecticide treatments were broadcast applied September 3, 2002, using a tractor mounted spray boom with 19 X TJ-60 11003VS nozzles at 20 psi delivering 27.5 gpa.

Populations of beet armyworm and alfalfa caterpillar were measured in each plot with a standard 15 inch diameter insect net consisting of ten 180^{o} sweeps on September 4, 6, 10, 13, and 17, 2002 or 1, 3, 7, 10, and 14 days after treatment (DAT).

The Lorsban 4 E treatment, Intrepid, Steward, and Success provided excellent beet armyworm and alfalfa caterpillar control at all application rates through the 14 DAT sample, Table 1 and Table 2. Dipel, Dipel DF + XenTari, and Warrior did not adequately control beet armyworm. The beet armyworm populations in the Warrior treated plots exceeded the levels in the untreated control for all sampling dates except 1 DAT. Dipel DF + XenTari and Dipel alone provided good control of alfalfa caterpillar on all sampling dates except 1 DAT, Tables 2. Alfalfa caterpillar populations in the Warrior plots exceeded the levels in the untreated control on all sampling dates after 3 DAT.

Population levels of bigeyed bug were adversely affected by treatments with Lorsban, Warrior and the two highest rates of Steward. Damsel bug populations were adversely affected by treatments with Lorsban, Warrior, and the 6.7 fluid ounces per acre rate of Steward. Population levels of minute pirate bug, green lacewing, collops beetle, and spiders were not adversely affected by any of the insecticide treatments.

Steward is an insecticide recently development by E. I. Dupont de Nemours & Co. (Inc.) and is now registered for use on alfalfa grown for hay in California. Success is an insecticide developed by Dow AgroSciences that is not currently registered for use on alfalfa. Intrepid is an insecticide under development by Dow AgroSciences and is not registered for use on alfalfa.

Table 1. Mean Numbers^{w} of Beet Armyworms per Ten Sweeps in Alfalfa, Holtville, CA, 2002.

Treatment	Product/acre	1 DAT^{xz}	3 DAT^{z}	7 DAT^{z}	10 DAT^{z}	14 DAT	PTM^{yz}
Untreated	----------	18.0 a	20.4 a	36.3 ab	10.2 a	9.5 bc	19.4 a
Success 2SC	3.0 fl oz	3.1 de	2.0 e	0.7 ef	0.7 cd	5.3 c	2.5 fg
Success 2SC	6.0 fl oz	3.6 cde	4.5 bcd	0.5 f	2.4 bc	3.5 c	3.2 ef
Intrepid 2 SC	4.0 fl oz	8.6 abc	4.5 bcd	6.4 cd	0.07 cd	3.0 c	5.7 cd
Intrepid 2 SC	6.0 fl oz	6.5 bcd	3.6 cde	0.9 ef	0.03 d	5.0 c	3.4 def
Steward 1.25 SC	4.6 fl oz	3.5 cde	6.9 bc	3.3 de	1.4 cd	6.5 c	5.1 de
Steward 1.25 SC	6.7 fl oz	2.8 de	2.8 de	1.3 ef	1.1 cd	3.8 c	2.8 fg
Steward 1.25 SC	11.3 fl oz	3.4 cde	1.7 e	0.4 f	0.03 d	1.8 c	1.7 g
Lorsban 4 E	32.0 fl oz	2.2 e	2.1 de	1.3 ef	2.7 bc	5.8 c	3.1 ef
Dipel DF + XenTari 10.3%	12.0 dry oz + 4.0 dry oz	5.7 bcde	7.7 b	16.8 bc	1.0 cd	15.3 ab	10.0 b
Dipel DF	12.0 dry oz	7.6 abcd	6.3 bc	10.1 cd	6.1 ab	8.3 bc	8.5 b
Warrior	3.8 fl oz	10.0 ab	22.0 a	58.4 a	11.4 a	20.5 a	25.5 a

^{w} Mean separations within columns by $LSD_{0.05}$. ^{x} Days after treatment. ^{y} PTM = Post treatment mean. ^{z} Log transformed data used for analysis; reverse transformed means reported.

Table 2. Mean Numbers[w] of Alfalfa Caterpillars per Ten Sweeps in Alfalfa, Holtville, CA, 2002.

Treatment	Product/acre	1 DAT[x]	3 DAT[z]	7 DAT	10 DAT	14 DAT[z]	PTM[y]
Untreated	----------	5.3 a	3.4 a	4.0 b	1.3 ab	1.1 ab	3.0 a
Success 2SC	3.0 fl oz	4.0 abc	0.6 cd	0.0 d	0.0 c	0.0 c	1.0 bcd
Success 2SC	6.0 fl oz	0.8 d	1.1 cd	0.0 d	0.5 bc	0.4 bc	0.5 d
Intrepid 2 SC	4.0 fl oz	5.0 a	1.1 cd	2.0 c	0.3 c	0.2 c	1.7 b
Intrepid 2 SC	6.0 fl oz	5.0 a	0.9 cd	0.3 d	0.0 c	0.0 c	1.3 bcd
Steward 1.25 SC	4.6 fl oz	3.0 abcd	1.9 abc	0.8 cd	0.0 c	0.0 c	1.3 bcd
Steward 1.25 SC	6.7 fl oz	1.3 cd	0.6 cd	0.5 cd	0.0 c	0.0 c	0.5 d
Steward 1.25 SC	11.3 fl oz	3.0 abcd	1.2 bcd	0.3 d	0.3 c	0.2 c	1.0 bcd
Lorsban 4 E	32.0 fl oz	2.0 bcd	0.4 d	0.0 d	0.0 c	0.0 c	0.7 cd
Dipel DF + XenTari 10.3%	12.0 dry oz + 4.0 dry oz	3.0 abcd	1.1 cd	2.0 c	0.3 c	0.2 c	1.5 bc
Dipel DF	12.0 dry oz	4.8 ab	0.9 cd	1.0 cd	0.3 c	0.2 c	1.5 bc
Warrior	3.8 fl oz	3.8 abc	2.9 ab	5.8 a	1.5 a	1.2 a	3.1 a

[w] Mean separations within columns by $LSD_{0.05}$. [x] Days after treatment. [y] PTM = Post treatment mean. [z] Log transformed data used for analysis; reverse transformed means reported.

COMMON DISEASES OF ALFALFA

Thomas A. Turini

Alfalfa should be productive for many years. However, the life span of an alfalfa fields is rarely longer than 4 years due to decline in productivity. Pathogens, particularly those attacking roots and crowns, can substantially contribute to stand decline.

Many pathogens affect alfalfa and it is common for established alfalfa plants to host more than one pathogen. Therefore, diagnosis can be complicated. The following are a few diseases that could affect alfalfa in desert production areas.

Rhyzoctonia root and stem canker, caused by the fungus *Rhyzoctonia solani*, is one of the most common alfalfa diseases in the low desert. This disease is characterized by the cankers on the stems crowns and roots. During the summer, the root lesions appear as dry, tan, round or elliptical cankers on tap roots around the emerging lateral roots. As lesions expand, they may grow together girdling the root. If this occurs in the upper portion of the tap root, the plant will die. However, if the plant survives the summer, it recovers. During the fall and winter, the cankers heal and turn black. During the winter, while the fungus is inactive, some roots re-grow. Typically, this disease occurs severely in roughly circular localized patches within a field or in areas where drainage is a problem.

In addition, this fungus may be responsible for severe **seedling loss**. Seedlings attacked by *R. solani* have roots and lower stems that are shrunken and brown. *Pythium spp*. can also cause seedling loss before or shortly after emergence. *R. solani* can cause seedling death at any stage of seedling development.
Warm wet soil conditions favor disease development. The optimum temperature range of this fungus is 77^{o} – 86^{o}F.

Phytophthora root rot is typically caused by *Phytophthora megasperma* in the low desert. Above ground symptoms appear as a general wilting.

Lesions form on the taproot. Typically, lesions start where lateral roots emerge. Lesions have diffuse margins and a yellow discoloration extends through the root cortex into the xylem. If the lesions are limited to the tap root and conditions cease to favor disease development, the plants will recover. However, the plant will die if the infection spreads to the crown.

In fall, winter and spring, the *P. megasperma* that causes damage grows optimally at temperatures from 75^o – 81^{o}F. In addition, a high-temperature isolate is present in Imperial County. This isolate grows optimally at temperatures from 84^o – 91^{o}F and is capable of growth at 102^{o}F.

Texas root rot, caused by *Phymatotrichopsis omnivore (Phymototrichum omnivorum* and *Oozonium omnivorum),* occurs in localized areas in the low desert. The characteristic dieback is obvious during the hotter months. Circular to oblong patches of alfalfa within the field will die out leaving only grassy weeds. The fungus causes a rot of the cortex, which results in leaf bronzing, wilting and plant death. Tan, coarse fungal strands (mycelium) present on the root surface are diagnostic for the disease. Texas root rot tends to occur year after year in the same area of the same fields.

The presence of this fungus may depress the value of land, so diagnosis of the disease should always be confirmed by a plant pathologist with experience with this disease.

Summer black stem and leaf spot is caused by the fungus *Cercospora medicaginis*. It is more common in moist regions, but the winter or early spring temperatures of the low desert can be favorable and it can appear in low desert production areas. It can reduce both yield and quality. The disease first appears as brown leaf spots with irregular margins. As the fungus produces spores the lesions take on a silver appearance. Spots are 1/8 to ¼ inch in diameter and are usually surrounded by a diffuse yellow margin. Two or three spots can cause a leaflet to drop. Stem infections result in long brown lesions that may grow together and discolor most of the stems. The fungus does not move into the vascular tissues, so only the cortex is affected.
Optimum temperature for disease development is between 75^o-82^{o}F and 100% humidity is required for abundant sporulation or infection. This usually occurs on the lower leaves, so the lower portion of the plant may be defoliated.

Control
For some of these diseases, resistant varieties are available. In addition, severity of Phytophthora and Rhyzoctonia root rot can be reduced by avoiding the waterlogged conditions that favor these diseases.

MELON VINE COLLAPSE; CAUSE AND MANAGEMENT OPTIONS

Thomas A. Turini

Late in the spring melon season, there is a danger that melon vines will collapse as the fruit are approaching maturity. High temperatures, a large crop and the presence of certain soil-borne fungi are a potentially devastating combination for melon vines in the low desert.

Vine decline, caused by *Monosporascus cannonballus*, and sudden wilt, caused by *Pythium spp*., are the most common causes of late-season melon vine death. These diseases will appear similar from a distance. In both cases, there may be a field wide collapse or the collapse may occur in isolated patches or at the tail end of the field.

Even by examining roots, distinguishing the two diseases can be difficult without laboratory tests. To determine if *M. cannonballus* is present, inspect dead roots for small black round structures that protrude from the dead tissue. These structures can be seen with the naked eye. However, *M. cannonballus* will produce these structures only on dead roots, so at early stages of disease development, both fungi will cause a brownish discoloration to develop on roots.

Vine decline *(M. cannonballus)* High temperatures favor the growth of this fungus and vine collapse. Optimum temperatures for *M. cannonballus* vegetative (hyphal) growth are from 77^o to 95^{o}F, and from 77^o to 86^{o}F for spore (ascospore) production. The plant produces blockages (tylosis) in response to the combination of a *M. cannonballus* infection and plant stress. The stress may be caused by high temperatures, too little or too much water, heavy fruit load or insect infestations or a combination of these factors.

On dead roots, usually after harvest, the fungus produces round black structures (perithecia) that protrude from the root tissue. These structures can be seen with the naked eye and are diagnostic for this disease. Each perithecia contains many ascospores, which can survive in the soil without a host for many years. The fungus can produce more than 400,000 ascospores on a single root system.

Fumigants applied before planting reduces the number of viable ascospores in the soil and the percentage of roots infected. However, these materials are expensive and methyl bromide will be banned in the United States by 2005 and worldwide by 2015.

Two management techniques prevented ascospore production in studies conducted by Michael Stanghellini. Ascospores are capable of surviving under unfavorable conditions. However, before ascospore production, the fungus is vulnerable. If ascospores have not yet been produced, an application of metam sodium or uprooting the plants and allowing the roots to dry on the soil surface will kill the fungus. Since most of these spores are produced 1 to 3 weeks after the crop is harvested, the use of either of these techniques soon after harvest could help prevent the buildup of spore concentrations in the soil to levels that are likely to cause economic damage to the next melon crop planted in the same field.

The relative susceptibility of muskmelon varieties to vine decline was compared in a study conducted at the University of California Desert Research and Extension Center in 2002. Under the conditions of this study, in general, the honeydew vines had fewer lesions on the roots and the effect of the disease on the vines was less severe than the effect on the cantaloupe varieties. In addition, of the 14 cantaloupe varieties included, Esteem (Syngenta) had lower vine decline severity than all varieties with the exception of Don Carlos (Syngenta).

Sudden wilt is caused by several species of *Pythium*, including *P. aphanidermatum*, *P. myriotylum* and *P. ultimum*. Musk melon, watermelon, summer squash, cucumber and pumpkin can be affected by this disease, which causes wilting, plant death and substantial crop loss.

Pythium spp. are water molds. Wet soils favor development of disease caused by any of these species. The optimum soil temperatures for *P. myriotylum* and *P. aphanadermatum* are from 90° to 99 °F. *P. ultimum* is favored by much lower temperatures.

Pythium spp. can be carried into the field in water or on soil. In addition the fungus can survive in the soil by producing thick-walled spores (oospores) that are capable of surviving for 2 to 12 years in the soil. It is not unusual for the disease to spread down and across the rows rather quickly.
Sudden wilt disease development is favored by saturated soil conditions, so avoid waterlogged soil conditions to prevent diseases caused by *Pythium spp*. Planting on raised beds to allow for maximum drainage, using alternate furrow irrigations, and avoiding saturating beds will reduce the likelihood that this disease will occur.

DRINKING WATER FOR LIVESTOCK

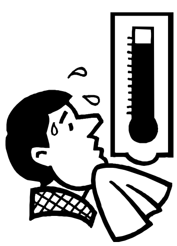
Juan N. Guerrero

Now that summer weather is upon us, it is important to assure good water quality for all our livestock and for pets. A constant supply of clean, fresh water is vital for all livestock and pets to endure hot temperatures. Colorado River water usually contains from 750 to 850 mg/l (or parts per million) of total dissolved salts. Although this level may be somewhat salty tasting (for some people), it is quite satisfactory for all livestock and pets. The upper limit of total dissolved salts that is recommended for livestock is 1000 mg/l. Water that has 2999 mg/l of total dissolved salts is satisfactory for livestock. Water of this saltiness level might initially cause diarrhea in unaccustomed animals, but as the animals become accustomed, they will perform normally. Water that has greater than 3000 mg/l of total dissolved salts is not recommended for livestock.

Because of the desert summer heat, water in livestock drinkers exposed to direct sunlight might become too warm. The warm water *per se* is not the problem, but rather the warm water permits the growth of algae. During the summer, fresh water should be provided at all times to livestock and to pets. Sometimes the algal growth in stagnant water grows to intolerable levels making the water very turbid and green in color. When filaments of algae are present in the water, then the water should be changed immediately. Permitting growth of algae in the drinking water is indicative of poor livestock husbandry. Water for livestock does not have to be crystal clear, but it should be fresh and changed frequently.

Closely associated with uncontrolled algae growth in a livestock drinker, is the possibility of cyanobacteria (blue-green algae) poisoning. Cyanobacteria are ubiquitous and grow quickly on hot, sunny days, and in warm water. At high levels of cyanobacteria populations, the water may appear dark green or brownish green. Toxins from cyanobacteria are poisonous to cattle, horses, sheep, pigs, poultry, rabbits and dogs. Not all cyanobacteria are toxic, nor do all cyanobacteria that can produce toxins do so under all conditions. Algal poisoning appears quickly and has no known antidotes.

A mature 1000 lb bovine, during the desert summer, may drink from 25 to 30 gallons of water per day, a mature horse from 15 to 20 gallons. Exercise makes water consumption increase. Large drinkers for few animals is not a good idea. A practical solution is to provide smaller drinkers with a float valve so fresh water is being replenished as the livestock drink their water. Another solution is to have a constant small trickle of water flow into the drinker. In this case, the drinker needs an overflow siphon to carry away any excess water. The excess water should flow onto a field and not into drains. Nipple drinkers work well for swine and dogs.



MANAGING CUTTING SCHEDULES FOR STAND LONGEVITY

Herman Meister

Stage of maturity at harvest affects alfalfa forage yield, quality, and stand persistence. Alfalfa has the potential to produce substantial tonnage of quality forage, high in protein and low in fiber. Obtaining the highest forage yields requires cutting at late-maturity stages. Cutting at early-maturity stages maximizes quality, but may damage the crop.

For example, research has shown that continually cutting at the bud stage produces lower yields and higher quality hay than cutting at the traditional one-tenth-bloom stage. The stand also is thinned and weed competition is reduced with continual bud-stage cutting. A balance between forage yield and quality is necessary in order to preserve the stand.

When alfalfa is cut, the plant uses energy stored in the roots to regrow. The alfalfa plant continues to draw on the roots until the top growth is about 8 to 12 inches tall. Then the plant has enough leaf area to provide not only for continued growth, but to put some energy back into the roots for storage. The longer the alfalfa is allowed to grow, the more energy can be stored in the roots.

Deciding when to cut, based on the one-tenth-bloom concept is not an easy judgment to make accurately. I recommend using "regrowth" as basis for determining when to cut. UC data indicates that when regrowth averages 0.5 to 0.75 inch, the field is at approximately one-tenth bloom. I find that the regrowth method is easier to determine than trying to decide when 10% of the plants are showing bloom.

A continual spring "short cutting" schedule to produce high quality hay will not allow the alfalfa to sufficiently replenish root reserves before being cut again. The result is a plant that is continually becoming weaker and weaker as summer approaches. Summer grasses become a major problem along with heat stress and scald. To mitigate the effects of short cutting cycles in the spring, it is suggested that growers switch to a longer cycle starting in June to build back root reserves to withstand the harsh summer conditions. This means switching from milking hay to dry cow hay. The added tonnage partially offsets the lower price and the long-term life and productivity of the stand is greatly benefited.

PARTS PER BILLION, PARTS PER SCHMILLION

Keith S. Mayberry

Technology has advanced so rapidly in the last decade that the presence of a compound can be detected at *far lower* levels than ever before. In fact, it was once a great achievement to analyze for parts per million (ppm). Legal residue limits for a compound were set in ppm, however, even using the best kinds of equipment the actual results could still vary substantially from one test run to another.

Nowadays, we can detect some compounds in parts per billion! While the difference between a part per million and a part per billion (ppb) do not seem like much when the words roll off your tongue, the actual differences are enormous. A part per billion is ONE THOUSAND times smaller or less quantity than a part per million. So we can now detect substances at one-thousandth the concentration we could 10 or 15 years ago.

Unfortunately, the ability to test for a substance has far outstripped the ability of the general public to comprehend what the numbers actually mean. Let's take a look at some parts per billion comparisons.

One part per billion is equivalent to:

- One drop of water in an Olympic sized swimming pool,
- One pinch of salt in ten tons of potato chips,
- One minute in 2,000 years, or
- One penny in a $10,000,000 (that's ten million dollars)

Environmentalist groups are having a heyday with modern chemical analysis. They can stir up fear and controversy among the population by simply saying a particular substance was detected in a ppb range. Never mind that the level of contamination was infinitesimally small. It is not particularly important to these groups that no one knows what the effects will be on a person if they ate some vegetable that had one part per billion contamination of the substance. The burden of proof has shifted toward the vegetable grower having to prove the substance does not cause harm, rather than to a scientist to prove there is harm.

Lastly, we should be reminded that every day we are subject to being in contact with dozens of substances known to cause serious bodily harm. We accept these contacts without even thinking twice. Consider some of these examples.

Drive by any convenience store and you will see men, pregnant women, and small children pumping gasoline into cars. Then read the warning label on the gas pumps.

If you look in the cabinet under the kitchen or bathroom sink, you will often find products used to open drains, other chemicals to disinfect toilets, fingernail polish remover, and products to kill household bugs. Read the warning labels on some of these products and you can see how toxic they are.

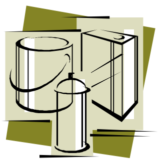
Walk into any garage and you can normally find products such as lacquer thinner, wood alcohol, mineral spirits, paints, insecticides, polishes, paint removers, etc. Read the warning labels on any of these products.

With the examples listed above, we have chosen to accept the risk of exposure and the potential consequences. We are not afraid of the outcome or we could dispose of all these products and pay someone to pump our gasoline.

A wise man once said the dosage makes the poison. It is a matter of how much contact we have with a substance, the concentration of the substance, and how often we are exposed to the substance.

There is a substance called perchlorate in the Colorado River water system. Federal limits range from 4 to 18 parts per billion for drinking water. And the water from the river is at or below this level. However, some suspect tests have shown that lettuce and leafy vegetables grown with this water have a concentration of up to an alleged 65 parts per billion of perchlorate. Environmental activist groups say the lettuce may be unsafe to consume. Frankly, I think the reasoning is bogus. If I eat a salad, which I usually do at least every other day, then I consume no more than perhaps a quarter head of lettuce per serving. So how much perchlorate did I actually eat? The Environmental Activist group that tested lettuce in the San Francisco Bay Area of California said 4 of 22 samples had perchlorate in them. So which lettuce am I eating? There is no lettuce being grown with Colorado River water for the next several months.

However, I drink 6-8 glasses of Colorado River water every day. Does this mean it is more hazardous for me to eat 3-4 salads per week than to drink 40-60 glasses of Colorado River water? Do babies eat salad? Few kids will touch the green crunchy stuff. I would like to review the scientific data that shows perchlorate at a few parts per billion eaten infrequently causes harm to anyone. It is easy to point fingers and make claims, but it is hard to present scientifically sound studies to prove it.



WATER CONSERVATION/LAND FALLOWING -FREQUENTLY ASKED QUESTIONS*

Khaled M. Bali

Water transfer and agricultural use of Colorado River water in the Imperial Valley have generated much speculation about agriculture, water use, water quality, and the future of the Salton Sea. I often receive questions about salinity, water quality, and water use in the valley. In my previous articles, I addressed some of the questions that are related to water quality. In this article I will address some of the questions that are related to water conservation, land fallowing and water transfer. I shall address these questions in non-technical format:

- If you had a good crystal ball, what do you think that the Salton Sea will look like in the year 2025? A dry Lake? At what Lake elevation? At what salinity level?

If I had a crystal ball, I would answer the question, but since I don't, I don't think that we have enough information to start making predictions. Computer models could be used to simulate salinity and lake levels as a function of several variables. The problem with simulation models is that if they are not calibrated and field verified, they may give erroneous answers and misleading predictions. However, if you still want to predict salinity and lake elevation at three different inflow scenarios, see page 41 of the Salton Sea Atlas (http://www.institute.redlands.edu/). The Atlas has salinity/lake level predictions to the year 2060.

If you are dealing with one variable such as inflow rate, it is relatively easy to predict lake elevation based on several scenarios of inflow (drainage water that flows to the Sea at a constant salinity level). We can estimate evaporation rate from the Sea (currently at about 1.3-1.4 million acre feet per year) based on weather data and Salton Sea surface area. However, the prediction of salinity level becomes difficult when you deal with two or more variables such as inflow rate, salinity of drainage water, rainfall, weather data, and other variables.

- The agricultural community is very divided over the restoration of the Salton Sea. In your opinion, what factors do you feel are responsible for this division?

The future of agriculture in Imperial Valley and the future of the Salton Sea depend on many factors. I think the most important factors are the availability of water for agriculture and water quality regulations. The availability of water for agriculture will influence the quantity and the quality of drainage water that feeds the Salton Sea. The quality of agricultural drainage water will be regulated in the near future. Currently, California Regional Water Quality Control Boards (CRWQCBs) are developing water quality standards for surface water bodies in California. In our region, CRWQCB- Region 7 has already developed silt/sediments and pathogens Total Maximum Daily Load (TMDL) limits for water bodies in our region. Other CRWQCBs are looking closely at agricultural discharges in the Central Valley of California. Agricultural landowners and growers in the Imperial Valley are required to submit self-determined Farm Water Quality Management Plans to the Regional Water Quality Control Board by September 28, 2003. Growers have the option of submitting their own plans or to submit plans through the Imperial County Farm Bureau's Voluntary TMDL Compliance Program. For additional information about this program, visit http://www.ivtmdl.com./

One of the problems that we are facing is that proposed drainage water quality regulations are based on current conditions and don't take into account the impact of the proposed water transfer or water conservation practices on water bodies in the region. For example, the current Technical Advisory Committee for the Salton Sea Nutrients TMDL is evaluating agricultural management practices that may reduce phosphorus-loading rate into the Salton Sea. Implementations of what we consider efficient practices to solve the phosphorous problem in the Sea may reduce the inflow rate to the Sea and increase the concentration of salts in agricultural drainage water.

- How much water can you conserve from land fallowing and what impact that will have on the Sea?

The average agricultural water use in the Imperial Valley is approximately 6.5 ac-ft/ac per year (one ac-ft is approximately 326,000 gallons). Some fields use more and some use less, the exact amount of water use depends on soil type, crop, weather conditions, and irrigation practices. But in general, more water is used on sandy soils (light soil) compared to clayey soils (heavy soils).

In theory, with fallowing you could conserve on average 6.5 ac-ft/ac per year. If you want to reduce the impact of land fallowing on the Salton Sea elevation and salinity, you need to send about 1/3 of this conserved water to the Salton Sea. So far, the net savings are about 4.5 ac-ft/ac. If you want to preserve soil quality of fallowed fields and minimize the degradation of land, you need to consider one more factor, leaching. Leaching will require at least 0.5-1 ac-ft/ac of water when fields are fallowed for a year or longer. For example, if you fallow a field for an extended period of time (several years), the salinity level in the soil will increase and soil structure will be impacted by the accumulation of sodium and other salts that migrate from the water table (ground water level in agricultural field is about 6-7 feet below soil surface) the to root zone and/or soil surface. Once you decide that you want to minimize impact of land fallowing on the Salton Sea and land quality, the net savings from land fallowing may be 3.5-4 ac-ft/ac per year. If you compare land fallowing to other water conservation practices, it yields the most water savings per acre (please note that land fallowing is considered a water conservation practice). Other water conservation practices may yield water savings as little as 0.5-1 ac-ft/ac per year.

Regarding the impact of land fallowing on the Sea, the impact on elevation would be minimal if you send 2 ac-ft/ac of fresh water to the Sea for each fallowed acre of land. This is a simplistic approach for considering the impact of fallowing on the Sea's elevation. The actual or predicted impact on the Sea and the entire ecosystem would require several hundred (or several thousand) pages of EIR/EIS reports. While I always like to keep things simple, when it comes to water quality and ecosystems, the simple approach doesn't work when you deal with large number of variables related to flow rate, water chemistry, temperature and many other factors.

- What kind of water conservation practices can be implemented to conserve water and make it available for transfer?

There are many water conservation practices that can be implemented to conserve water. In general they are two types; 1- systems such as pressurized systems like drip, sprinkler, low energy pressurized systems, basin irrigation, tail water recovery etc. 2- management practices such as irrigation scheduling, monitoring soil moisture, reducing surface runoff, land fallowing, etc.

When we consider water conservation practices, we have to understand that results obtained elsewhere may not be reproducible in the valley. For example, some growers in Arizona were able to conserve 50% of the applied water when they used drip irrigation systems. In general, you might expect such a high figure if you have a sandy soil and use 10-12 ac-ft/ac per year under surface irrigation (flood) and switch your irrigation system to subsurface drip. Research done at the USDA-ARS research center in Brawley (currently Imperial Valley Research Center) in the early 90's yielded no significant water savings when subsurface drip system was used to grow alfalfa on heavy soils. While water conservation was not significant, the use of drip increased alfalfa yield by approximately 20%. On the other hand, drip irrigation can save water on other soil types and on vegetable crops.

For additional information about Salton Sea salinity, water quality, and water conservation, please see our previous In-Our-Field articles (8/29/02 & 2/13/03) or visit our water quality website http://tmdl.ucdavis.edu/

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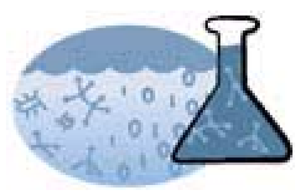

CIMIS REPORT

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 June 1 to August 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).

The Irrigation Management Unit (IID) provides farmers with a weekly CIMIS update. Farmers interested in receiving the updated CIMIS report on a weekly basis can call the IID at the above number. 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	June		July		August	
	1-15	16-30	1-15	15-31	1-15	16-31
Calipatria	0.39	0.40	0.39	0.38	0.35	0.32
El Centro (Seeley)	0.36	0.38	0.38	0.37	0.32	0.29
Holtville (Meloland)	0.38	0.39	0.39	0.38	0.34	0.31

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