Imperial County Agricultural Briefs

Features **From your Farm Advisors**

April, 2009

Information Needed: Vegetable and Field Crops Production Guidelines

Mark A. Trent

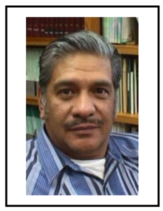
The Vegetable and Field Crops Production Guidelines are being updated for the 2009-2010 production season. Vegetable and field crops producers in Imperial County value these budgets for a number of reasons including farm business management and contract negotiations. Others in the ag industry including researchers, ag finance, and marketers also use these documents for various reasons. In order to publish the Guidelines in a timely manner for the upcoming season the Imperial County Cooperative Extension office is requesting input from growers and custom machine service providers.

Prevailing rates for custom machine field work is an integral part of the Guidelines and the information to produce this document can only be gained through growers and custom machine service providers. Those willing to help by providing input from their business can complete a secure online survey. Only the Vegetable Crops Advisor will have access to the information provided and your information will not be shared or published in any manner. The average from all respondents will be used to determine the prevailing rates and these averages will be the only published information from the survey.

There are 3 ways to access the online survey; 1) Type this link into the address bar of your web browser - http://ucce.ucdavis.edu/survey/survey.cfm?surveynumber=3508 or click this link if you have accessed this publication online. 2) Go to the Imperial County Cooperative Extension website at http://ceimperial.ucdavis.edu and click on "Custom Rates Production Guidelines Survey" in the blue menu box on the left side of the page. 3) Contact the Imperial County Cooperative Extension office at 760-352-9474 with your email address and we will send you the link.

Once you are at the survey, just type in your information in the box that corresponds with a particular field operation. It is OK to leave blank any operation that is not relevant to your business. At the end of the survey is a box that reads “Save Survey Information”. Clicking on that box will send the information. After sending the information a link will appear that you can save if you need to edit your responses.

If you would prefer to provide the information on paper, please contact Mark Trent at 760-352-9474 or stop by the office. As you know, the Crop Production Guidelines are very important to the ag industry and your help is very important to the timely publication of the updated versions. Thanks in advance for any information you can provide.



Tarping Hay

Juan N. Guerrero

Hay producers in the desert Southwest are all painfully aware that hay prices and demand have recently decreased significantly. In a buyers’ market, small seemingly insignificant defects in hay quality may become very costly. In the current hay market it would be very advisable to offer the best quality hay devoid of any quality defects. As desert hay producers are about to enter the maximum production period of the year, it is imperative to produce top quality hay. Uncovered spring-cut hay stored roadside for three or four months decreases in feed value (Figure 1). To protect hay quality and yield, one method of storing alfalfa hay throughout the long, hot summer is to place the hay in barns. Some local producers, indeed, do have hay storage barns to protect valuable alfalfa hay (Figure 2). Unfortunately, most local alfalfa growers do not have hay barns for protecting alfalfa hay quality. Barn-stored or tarped hay is worth money. The best objective source of local hay prices, in my humble opinion, is the federal Agricultural Marketing Service. For objective information regarding local hay prices I go on-line to http://www.ams.usda.gov and then go to the market news reports.

Covering hay with a plastic tarp (Figure 3) is a cheap alternative to conserve both hay quality and hay yield. There are several methods used to tarp hay. I am unaware of any scientific data regarding different tarping methods. Some growers only tarp top bales, leaving the rest of the stack exposed. Other growers tarp the top ½ of the stack. Still other growers tarp the entire stack, covering even the bottom bales. Since rainfall does not always fall at a 90° angle, I would advise covering at least the top ½ of the hay stack (covering all the way down, in my opinion, is better). The plastic tarp should also be securely tied down to the stack so that it doesn't blow away. Protecting summer stored hay with plastic tarps not only prevents bleaching but prevents dry matter losses as well.

Plastic tarps come in several different colors. I have no advice regarding which color tarps are better than others. In my experience, the plastic should be thick so that it doesn't tear easily when wind-blown. During very wet weather, even barn-stored or tarped hay, may absorb ground moisture and bottom bales may mold. I am aware that some persons have attempted to place plastic at ground level, but with varying results. I have tarped hay for 20 weeks during the summer. For hay baled at 14% moisture in May, after 20 weeks tarped hay still had about 10% moisture; the untarped hay had shrunk to 5% moisture levels. Also during this summer storage period, the ADF and NDF levels of the hay increased, decreasing the nutritive value of the hay. Brittle, dry hay is not the most recommendable hay for livestock.

Iris Yellow Spot Virus: A Continuing Threat to Onion Crops

Donna R. Henderson

Symptoms of IYSV on an onion plant.
www.ipmimages.org

Iris Yellow Spot Virus (IYSV) is a viral disease of bulb and seed onion crops that is transmitted by onion thrips *Thrips tabaci*. IYSV is characterized as genus tospovirus, virus family *Bunyaviridae.* The virus infects most *Allium* species and also is known to infect some ornamentals (iris, lisianthus) and some weeds (jimsonweed, tobacco, redroot pigweed) (UC-IPM). California produces approximately 14,569 ha of onions with a total value of $144 million, making it the top onion producing state in the U.S.

Antelope Valley (Los Angeles County), and Imperial Valley (Imperial County) are both major onion producers, and in recent years have identified IYSV as an emerging threat to the onion industry. The virus was first identified in the Imperial Valley in May, 2003 and since then has been positively identified in the Imperial Valley every year (Plant Health Progress, 2007). Onion plants with IYSV symptoms were diagnosed in 20, 60, and 40% of the Imperial County onion fields in 2004, 2005, and 2006, respectively (Plant Health Progress, 2007). Fortunately, the disease has not been severe enough to cause significant yield loss or damage. In 2005, IYSV was identified in the Antelope Valley in four onion fields. In two of the fields, IYSV was detected in more than 50% of the field; the other two fields had a 10% disease incidence of IYSV (Plant Health Progress, 2007). In January 2008 IYSV was positively identified in Yuma County, AZ in two commercial onion fields located in the southwest corner of the county. The fields had a disease incidence of 25%, and 2%, respectively (Plant Health Progress, 2008).

The symptoms of IYSV are yellow/straw colored diamond shaped lesions on the onion scape or leaves of the onion plant. Chlorotic lesions may coalesce into large chlorotic streaks capable of causing lodging of the onion plant. Infection can reduce plant size and vigor of the onion plant. Infection by IYSV can potentially cause total field loss, but in the Imperial Valley there has not been any total field loss reported (Plant Health Progress, 2007). Stressed onion plants are more susceptible to IYSV than otherwise healthy plants.

IYSV is transmitted by onion thrips throughout the growing season, and weeds or volunteer onions may be a host reservoir for maintaining IYSV between cropping seasons. IYSV infection may be highest on the border of crops. The virus disease is common in the Imperial Valley, but still occurs erratically. Management of the virus includes onion thrips control. Without the insect, the virus cannot infect nearby onion plants. Additionally, planting seed and bulb fields a safe distance from each other will decrease the spread of the virus between fields. Field practices that reduce volunteer onions and reduce weed populations may also help keep the virus in check. Currently, research is underway to determine if common weeds of Imperial Valley are good hosts for IYSV. With this information, the epidemiology of the virus can be better determined to aid onion producers in management decisions.

Lygus Bug Management in Alfalfa Grown for Seed

Eric Natwick and Martin Lopez

Lygus bug is the most important insect pest affecting production of alfalfa seed. Properly timed insecticides treatments based on realistic treatment levels are vitally important to successful insect management. Timing applications based on action thresholds and insect development stage helps to minimize pest control costs and more importantly to insure successful control of lygus bug. To control lygus bug we must understand the biology of this pest. Lygus bugs have three stages of development; egg, nymph and adult. There are 5 nymphal “instars” (periods between molts). Lygus bugs complete their lifecycle in about 28 days during the summer.

For maximum control, time insecticides applications to coincide with egg hatch and stage of development. Lygus bugs are most easily controlled as nymphs up to the 3rd instar. Older nymphs are more difficult to control, especially 5th instar nymphs. Adults, 4th and 5th instar nymphs are commonly found in alfalfa seed production fields after an insecticide treatment.

The strong flying adults are often repelled from seed production fields following an insecticide application, but quickly return when the repellency has subsided. Withhold insecticide application when newly hatched 1st instar nymphs are observed in the field to allow all eggs to hatch. Percentages of control are improved when most or all of the lygus bug eggs have hatched and some nymphs have developed to the 3rd instar. Lygus bug nymphs hatching a few days after an insecticide application often survive and an additional insecticide treatment may be necessary.

There are no strict action thresholds for lygus bug control in seed alfalfa, but suggested action thresholds are as follows:

- Early bloom, 4 to 6 bugs/sweep
  - prior to bees
- Bloom to seed set, 8 to 10 bugs per sweep
  - Extended treatment intervals protect bees
  - Less frequent disturbance of pollinators
  - Fewer insecticide applications lower costs
- Seed set to maturation,10 to 12 bugs per sweep
- Suggested action levels are not fixed but vary with field conditions

Several insecticides were evaluated for lygus bug control in alfalfa grown for seed at the University of California Desert Research and Extension Center in Imperial Valley, CA over the past three seasons and some of these new materials show promise for lygus bug control. Results from the 2006 research obtain a

Section 24c for Rimon and the 2007 results were used to support a Section 24c for Beleaf. The results of the 2008 alfalfa seed production season research in the Imperial Valley are summarized below.

Materials and Methods:

Site location: UC Desert Research and Extension Center
1004 Holton Road, El Centro, CA 92243

Host Crop: Alfalfa, var. CUF-101

Cultural practices: 40” beds, furrow irrigated, normal commercial practices

Experimental Design: Randomized complete block with 4 replicates; plots measured 50’ x 13.3’ (4 beds/plot)

Applications:

Equipment: Tractor mounted sprayer; 3 nozzles (TJ-60 1103VS) / bed delivering 53.4 gallons / acre (40 psi)

Dates: Application dates are listed in Table 1.

Table 1. Seed Alfalfa Insecticide Efficacy Trial, Holtville, California, 2008.

Treatment	oz/acre	Application Dates
1. Untreated	--------	-----------
2. Carzol 92 SP*	17.4	26 May, 10 June
3. Rimon	12.0	26 May, 10 June, 1 July
4. Rimon 0.83EC f/b Lorsban 4E	12.0 f/b 32.0	26 May & 10 June
5. NAI-2302 15EC	27.0	26 May, 10 June
6. NNI-0101 20SC	6.37	26 May, 10, 20 June
7. Beleaf 50 SG	2.8	26 May, 10 June
8. Beleaf 50 SG	5.6	26 May, 10 June
9. Beleaf 50 SG + Hero 1.25 EC	2.8 + 10.3	26 May, 10, 20 June, 1 July
10. Cobalt	32.0	26 May, 10, 20 June, 1 July
11. Lorsban 4E	32.0	26 May, 10 June, 1 July
12. Warrior 1 CS	3.84	26 May, 10, 20 June, 1 July

NIS @ 37.9 ml/4 gal added to foliar spray mixtures. *Buffered to pH 5.0.

Test procedures:

Prior to trial initiation, the alfalfa was cut and irrigated for seed production. Test materials were applied as needed at the specified rate equivalencies (Table 1). Pretreatment evaluations of insect populations in each plot were conducted on 19 May 2008. Post treatment evaluations were conducted on 29 May, 2, 9, 13, 16, 24, 30 June, 7 and 14 July 2008. During each evaluation, ten sweeps per plot were collected with a standard 15-inch diameter sweep net. Sweep samples were bagged, labeled, and frozen for later counting of lygus bug. Counts for small nymphs, large nymphs, adults, and all stages of lygus bug were tabulated (Tables 2 - 5). Stink bug evaluations for nymphs and adults are included in Tables 6-8. On 14 July 2008, mature seed pods were stripped from a few plants at random in each plot, hand-threshed to prevent loss of damaged seed and 100 seeds from each plot were examined under a binocular microscope for lygus damage, stink bug damage, chalcid damage, water damage, insect chewing, green seed and good seed (Table 9). NAI-2302 is Tolfenpyrad and NNI-0101 is Pyrifluqinazon both are products under development by Nichino America Inc. Neither product is currently registered for use in alfalfa.

Statistical analysis:

Raw data were analyzed using ANOVA and means were separated using Least Significant Difference Test (LSD; P=0.05) using MSTAT-C. Log (X+1) transformations were used, as needed, with transformed means presented in tables.

Results and Discussion:

Pre-treatment numbers of lygus bug adults, small nymphs and all lygus bug stages were similar (P=0.05) among treatments and the untreated control (UTC) (Table 1-4). All insecticide plots received treatments on 26 May and 10 June; thereafter, insecticide applications were made when the means for all lygus bug stages was near or over a treatment threshold of six lygus bugs per sweep within any treatment. All insecticide treatments had fewer small nymphs, large nymphs and all stages of lygus bug counts compared to the UTC on 29 May. While all treatments except for Beleaf at 2.8 oz/acre and Lorsban 4E had fewer lygus adults compared to the UTC on 29 May. By 2 June (7-days after treatment (DAT) 1) all lygus bug counts were lower than the UTC for all treatments except in the small nymphs and adult lygus bug counts for Warrior. On 9 June (14 DAT 1), all insecticide treatments except NAI-2302 15EC, Beleaf at 2.8 oz/acre, and Cobalt had significantly fewer small lygus bug nymphs, all but Beleaf 50 SG + Hero 1.25 EC had significantly fewer large nymphs, and all but Warrior had significantly fewer adults compared to the UTC. Counts for small lygus bug nymph in the NNI-0101, Beleaf at 5.6 oz/acre, Cobalt and Warrior treatments were not different from the UTC on 13 June (3-DAT 2), but all other insecticide treatments had counts that were significantly lower. For large nymph counts on 13 June, all insecticide treatments except Cobalt and Warrior were lower than the UTC and all treatments except Warrior had adult lygus bug counts that were lower than the UTC. Small and large lygus bug nymph counts for all but NNI-0101, Cobalt and Warrior were significantly lower than the UTC on 16 June (6-DAT2), but only Warrior for adults and NNI-0101, Cobalt, and Warrior for all nymphs did not have counts that were significantly lower than the UTC means.

Insecticide treatments NNI-0101, Cobalt, and Warrior were applied on 20 June because the lygus bug threshold was exceeded on 16 June. All insecticide treatment except NNI-1010, Lorsban 4E, and Warrior had small nymph counts that were lower (*P*=0.05) than the UTC on 24 June, and only Lorsban 4E, Warrior, Rimon at 12 oz/acre, and Rimon followed by Lorsban 4E had large nymph counts that were not different from the UTC (Tables 2 and 3). All insecticide treatment except Lorsban 4E and Warrior had adult and all lygus bug counts that were lower than the UTC on 24 June (Tables 4 and 5). On 30 June, all insecticide treatments had small nymph counts that were significantly lower than the UTC. For large nymph counts on 24 June only Rinom at 12 oz/acre, Cobalt, Lorsban, and Warrior treatments were not different from the UTC. Only Carzol, Rimon followed by Lorsban, NAI-2302, NNI-0101, and both rates of Beleaf had adult lygus bug counts that were lower than the UTC on 30 June. All insecticide treatment except Beleaf 50 SG + Hero 1.25 EC, Cobalt, Lorsban 4E, and Warrior had means for all lygus bugs that were significantly lower than the UTC on 30 June.

Insecticide treatments Rimon at 12 oz/acre (6.00), Beleaf 50 SG + Hero 1.25 EC (7.55), Cobalt (9.75), Lorsban 4E (8.38), and Warrior (9.13) were applied on 1 July because they had “all lygus bug” counts that exceeded the treatment threshold of six per sweep. All insecticide treatment except Cobalt and Warrior for small lygus bug nymphs had counts that were lower (*P*=0.05) than the UTC on 7 July; there were no differences among the treatment means or the UTC for large nymphs and adult lygus bugs (Table 2-5). Only Carzol, NAI-2302, NNI-0101, and both rates of Beleaf, had all lygus bugs counts that were lower than the UTC on 7 July. By 14 July all counts for all treatments and lygus bug developments were either similar or higher than the UTC.

The stink bug populations were very low until after mid-June and the only treatment for adults throughout the study that was lower than the UCT was Beleaf + Hero in the 7 July count. There were no differences among treatments for nymphs until 13 June when all treatments except NAI-2302 and NAI-0101 had fewer (*P*=0.05) stink bug nymphs than the UTC (Tables 6-8). All insecticide treatments had significantly fewer stinkbug nymphs than the UTC on 16 June and all but NNI-0101 and both rates of Beleaf had fewer stink bugs of all stages compared to the UTC. On 24 June, none of the insecticide treatments had significantly lower stink bug nymph counts than the UTC, and only Beleaf + Hero and Cobalt had fewer stink bugs of all stages compared to the UTC. Carzol, Beleaf + Hero, and Cobalt had fewer stink bug nymphs and Carzol, Beleaf at 2.8 oz/acre and Cobalt had fewer stink bugs of all stages compared to the UTC on 30 June. None of the insecticide treatments had significantly lower stink bug nymph counts compared to the UTC on 7 July, and only Rimon followed by Lorsban, Beleaf + Hero and Lorsban had fewer stink bugs of all stages compared to the UTC. There were no differences among the insecticide treatments and the UTC for stink bug nymphs, adults or all stages on 14 July.

All insecticide treatments had significantly (*P* = 0.05) lower percentages of lygus bug damaged seed than the UTC with the exception of NNI-0101 (Table 9). All insecticide treatments except Carzol, Rimon, Rimon followed by Lorsban, and NNI-0101 had significantly lower percentages of stink bug damaged seed than the UTC. There were no differences among the means for alfalfa seed chalcid damaged seed, water damage and green seed. Data were not shown for chewing damage to seed other insects, such as worm pests, because none was detected. All of the insecticide treatments had significantly higher percentages of good seed compared to the untreated control except NNI-0101.

In conclusion, all insecticide treatments except NNI-0101 and those treatments that included a pyrethroid insecticide had good efficacy for control of lygus bug. Treatments that include a pyrethroid have consistently shown poor efficacy against lygus bug over the past three years in studies conducted in the Imperial Valley. None of the insecticide treatments had exceptional efficacy against stink bugs. Carzol 92 SP, Rimon 0.83 EC followed by Lorsban 4E, NAI-2302 15 EC, and both rates of Beleaf 50 SG all had exceptional residual activity against lygus bug in this study.

Table 2. Lygus Bug Small Nymphs per Sweeps in Seed Alfalfa. Holtville, CA. 2008.

Treatment	oz/acre	19 May	29 May	2 Jun	9 Jun	13 Jun	16 Jun	24 Jun [z]	30 Jun	7 Jul [z]	14 Jul [z]
Untreated	--------	5.48	2.83 a	3.73 a	3.65 a	3.05 a	5.15 a	0.45 a	0.93 a	0.35 bc	0.52 b
Carzol 92 SP*	17.4	4.60	0.95 b	0.65 b	0.98 de	1.15 bcd	0.75 d	0.07 c	0.08 bc	0.20 bcd	0.45 b
Rimon	12.0	3.20	1.10 b	0.63 b	0.80 e	1.2 bcd	1.50 cd	0.20 bc	0.45 b	0.26 bcd	0.48 b
Rimon 0.83EC f/b Lorsban 4E	12.0 f/b 32.0	4.10	1.40 b	0.85 b	0.88 e	0.43 d	0.78 d	0.13 bc	0.05 bc	0.32 bcd	0.44 b
NAI-2302 15EC	27.0	3.58	0.63 b	0.73 b	3.23 ab	0.70 cd	2.03 bcd	0.08 c	0.23 bc	0.09 d	0.44 b
NNI-0101 20SC	6.37	3.55	1.05 b	1.48 b	1.75 cde	2.10 abc	3.28 abc	0.22 abc	0.15 bc	0.10 d	0.44 b
Beleaf 50 SG	2.8	5.13	1.30 b	1.30 b	2.30 abcd	0.78 cd	0.73 d	0.18 bc	0.00 c	0.19 bcd	0.42 b
Beleaf 50 SG	5.6	3.45	0.55 b	1.10 b	1.48 cde	1.98 abc	1.38 cd	0.74 c	0.28 bc	0.15 cd	0.33 b
Beleaf 50 SG + Hero 1.25 EC	2.8 + 10.3	5.53	0.75 b	1.18 b	2.03 bcde	1.30 bcd	2.53 bcd	0.12 c	0.13 bc	0.40 b	1.03 a
Cobalt	32.0	3.60	1.05 b	0.78 b	2.38 abc	1.75 abcd	4.85 a	0.18 bc	0.23 bc	0.72 a	1.05 a
Lorsban 4E	32.0	5.00	1.23 b	1.58 b	1.93 bcde	1.48 bcd	1.58 cd	0.36 ab	0.28 bc	0.34 bc	0.56 b
Warrior 1 CS	3.84	6.00	1.25 b	3.43 a	1.78 cde	2.43 ab	4.00 ab	0.36 ab	0.18 bc	0.68 a	1.15 a
LSD; *P*=0.05		NS [y]	0.85	0.98	1.39	1.50	2.30	0.24	0.43	0.24	0.33

Means within columns followed by the same letter are not significantly different; $LSD_{0.05}$.
[y] Not significant by ANOVA; *P*=0.05.
[z] Log 10^x transformed data used for analysis.

Table 3. Lygus Bug Large Nymphs per Sweeps in Seed Alfalfa. Holtville, CA. 2008.

Treatment	oz/acre	19 May	29 May	2 Jun	9 Jun [z]	13 Jun [z]	16 Jun [z]	24 Jun [z]	30 Jun [z]	7 Jul	14 Jul
Untreated	--------	10.33	6.50 a	7.53 a	0.76 a	0.72 a	0.76 a	0.66 a	0.24 a	0.88	1.88 cd
Carzol 92 SP*	17.4	9.85	1.63 de	1.13 def	0.24 d	0.50 bcd	0.17 cd	0.21 cd	0.00 c	0.25	1.83 d
Rimon	12.0	12.05	2.40 bcde	1.08 ef	0.35 cd	0.33 def	0.19 cd	0.38 abc	0.12 abc	0.28	2.83 cd
Rimon 0.83EC f/b Lorsban 4E	12.0 f/b 32.0	4.93	3.68 bc	1.48 cdef	0.27 d	0.23 f	0.14 d	0.41 abc	0.08 bc	0.60	2.20 cd
NAI-2302 15EC	27.0	12.93	1.58 de	0.53 f	0.41 bcd	0.25 f	0.20 cd	0.21 cd	0.04 bc	0.10	1.23 d
NNI-0101 20SC	6.37	12.60	3.33 bcd	2.85 c	0.54 bc	0.46 bcd	0.56 ab	0.33 bcd	0.07 bc	0.55	1.58 d
Beleaf 50 SG	2.8	7.33	4.18 b	2.70 cd	0.53 bc	0.24 f	0.19 cd	0.26 cd	0.00 c	0.13	1.30 d
Beleaf 50 SG	5.6	10.65	2.18 cde	1.33 cdef	0.41 bcd	0.26 ef	0.17 cd	0.07 d	0.06 bc	0.10	1.25 d
Beleaf 50 SG + Hero 1.25 EC	2.8 + 10.3	8.65	1.45 e	2.35 cde	0.57 ab	0.44 bcde	0.38 bc	0.34 bcd	0.05 bc	0.50	9.30 b
Cobalt	32.0	15.48	2.73 bcde	1.88 cdef	0.50 bc	0.55 abc	0.73 a	0.24 cd	0.14 ab	0.83	11.18 ab
Lorsban 4E	32.0	10.13	3.88 bc	2.23 cde	0.37 bcd	0.40 cdef	0.29 cd	0.46 abc	0.16 ab	0.43	4.08 c
Warrior 1 CS	3.84	9.23	4.05 b	4.98 b	0.52 bc	0.60 ab	0.71 a	0.57 ab	0.13 abc	1.35	11.73 a
LSD; *P*=0.05		NS [y]	1.86	1.59	0.21	0.19	0.22	0.28	0.13	NS [y]	2.23

Means within columns followed by the same letter are not significantly different; $LSD_{0.05}$.
[y] Not significant by ANOVA; *P*=0.05.
[z] Log 10^x transformed data used for analysis.

Table 4. Lygus Bug Adults per Sweeps in Seed Alfalfa. Holtville, CA. 2008.

Treatment	oz/acre	19 May	29 May	2 Jun	9 Jun	13 Jun [z]	16 Jun	24 Jun [z]	30 Jun [z]	7 Jul	14 Jul
Untreated	--------	3.70	5.63 a	9.13 a	7.38 a	0.82 a	5.40 a	0.52 a	0.94 ab	4.15	2.28 bcd
Carzol 92 SP*	17.4	3.73	1.78 d	2.75 de	1.98 d	0.52 bcd	0.93 cd	0.15 cde	0.59 d	1.95	1.75 cd
Rimon	12.0	2.70	2.35 d	3.40 cde	3.35 cd	0.34 de	0.80 cd	0.18 cde	0.70 abcd	1.95	2.00 bcd
Rimon 0.83EC f/b Lorsban 4E	12.0 f/b 32.0	2.15	2.88 cd	5.10 bcd	1.55 d	0.36 cde	1.13 cd	0.21 cde	0.69 bcd	3.88	2.05 bcd
NAI-2302 15EC	27.0	2.45	2.40 d	2.35 e	1.48 d	0.30 e	0.93 cd	0.10 de	0.56 d	1.50	1.53 bcd
NNI-0101 20SC	6.37	3.68	2.83 cd	5.68 bc	3.58 cd	0.48 bcde	2.75 bc	0.28 bcd	0.69 bcd	1.35	1.63 cd
Beleaf 50 SG	2.8	2.60	4.70 ab	3.88 cde	3.73 bcd	0.42 cde	1.98 bcd	0.18 cde	0.62 cd	2.05	3.15 ab
Beleaf 50 SG	5.6	5.85	2.98 bcd	3.40 cde	2.23 cd	0.35 de	0.63 d	0.01 e	0.57 d	1.08	2.53 bcd
Beleaf 50 SG + Hero 1.25 EC	2.8 + 10.3	2.35	1.33 d	4.50 cde	4.40 bc	0.56 bc	1.58 bcd	0.20 cde	0.85 abc	3.90	2.25 bcd
Cobalt	32.0	6.00	3.03 bcd	3.43 cde	3.00 cd	0.41 cde	2.68 bcd	0.19 cde	0.95 a	3.30	2.73 bcd
Lorsban 4E	32.0	2.95	4.65 ab	4.63 bcde	1.83 d	0.44 cde	1.60 bcd	0.35 abc	0.80 abcd	2.03	2.93 bc
Warrior 1 CS	3.84	3.28	4.28	6.98 ab	6.00 ab	0.66 ab	3.30 ab	0.46 ab	0.90 ab	2.70	4.53 a
LSD; *P*=0.05		NS [y]	1.74	2.40	2.35	0.21	2.11	0.24	0.25	NS [y]	1.38

Means within columns followed by the same letter are not significantly different; $LSD_{0.05}$.

[y] Not significant by ANOVA; *P*=0.05.

[z] Log 10^x transformed data used for analysis.

Table 5. Lygus Bug All Stages per Sweeps in Seed Alfalfa. Holtville, CA. 2008.

Treatment	oz/acre	19 May	29 May	2 Jun	9 Jun	13 Jun [z]	16 Jun	24 Jun [z]	30 Jun [z]	7 Jul [z]	14 Jul
Untreated	--------	19.50	14.95 a	20.38 a	16.28 a	1.13 a	15.70 a	0.93 a	1.01 a	0.84 abc	7.15 c
Carzol 92 SP*	17.4	18.18	4.35 de	4.53 de	3.83 de	0.83 bc	2.20 d	0.33 de	0.60 e	0.54 de	6.70 c
Rimon	12.0	17.95	5.85 cde	5.10 de	5.40 cde	0.63 cde	2.88 d	0.52 bcd	0.74 bcde	0.60 cde	7.33 c
Rimon 0.83EC f/b Lorsban 4E	12.0 f/b 32.0	11.18	7.95 bc	7.43 cde	3.28 e	0.52 e	2.33 d	0.55 bcd	0.71 cde	0.77 abcd	6.50 c
NAI-2302 15EC	27.0	18.95	4.60 cde	3.60 e	6.38 bcde	0.53 e	3.65 d	0.32 de	0.60 e	0.45 e	4.93 c
NNI-0101 20SC	6.37	19.83	7.20 bcd	10.00 c	8.20 bcd	0.81 bcd	9.13 bc	0.55 bcd	0.72 cde	0.45 e	4.95 c
Beleaf 50 SG	2.8	15.05	10.18 b	7.88 cde	8.48 bc	0.60 de	3.28 d	0.48 cd	0.62 de	0.51 de	6.13 c
Beleaf 50 SG	5.6	19.95	5.70 cde	5.83 cde	5.33 cde	0.67 cde	2.55 d	0.14 e	0.60 e	0.41 e	5.10 c
Beleaf 50 SG + Hero 1.25 EC	2.8 + 10.3	16.53	3.53 e	8.03 cd	9.43 bc	0.82 bc	5.98 cd	0.45 cde	0.87 abcd	0.85 abc	21.95 b
Cobalt	32.0	25.08	6.80 bcde	5.98 cde	7.63 bcde	0.84 bc	12.53 ab	0.38 de	0.98 ab	0.99 a	24.50 ab
Lorsban 4E	32.0	18.08	9.75 b	8.43 cd	5.13 cde	0.76 cd	4.35 cd	0.71 abc	0.82 abcde	0.69 bcde	9.80 c
Warrior 1 CS	3.84	18.50	9.58 b	15.38 b	10.18 b	0.99 ab	11.83 ab	0.82 ab	0.93 abc	0.94 ab	30.73 a
LSD; *P*=0.05		NS [y]	3.46	4.31	4.63	0.22	5.28	0.32	0.25	0.29	6.51

Means within columns followed by the same letter are not significantly different; $LSD_{0.05}$.
[y] Not significant by ANOVA; *P*=0.05.
[z] Log 10^x transformed data used for analysis.

Table 6. Stink Bug Nymphs per Sweeps in Seed Alfalfa. Holtville, CA. 2008.

Treatment	oz/acre	19 May	29 May	2 Jun	9 Jun	13 Jun	16 Jun	24 Jun	30 Jun [z]	7 Jul [z]	14 Jul
Untreated	--------	0.25	0.25	0.50	0.00	1.00 a	1.75 a	2.25 abc	0.38 bc	0.35 ab	1.50
Carzol 92 SP*	17.4	0.00	0.25	1.00	0.00	0.00 b	0.25 c	0.755 bc	0.00 d	0.15 b	0.50
Rimon	12.0	0.25	0.00	0.25	0.00	0.00 b	0.00 c	0.50 c	0.27 bcd	0.08 b	0.00
Rimon 0.83EC f/b Lorsban 4E	12.0 f/b 32.0	0.00	0.00	0.25	0.00	0.00 b	0.00 c	0.75 bc	0.24 bcd	0.23 ab	0.75
NAI-2302 15EC	27.0	0.25	0.00	0.25	0.00	0.50 ab	0.00 c	3.00 ab	0.23 bcd	0.51 a	1.00
NNI-0101 20SC	6.37	0.00	0.50	0.75	2.25	0.75 a	0.75 b	3.25 a	0.79 a	0.56 a	1.50
Beleaf 50 SG	2.8	0.00	0.00	0.75	0.00	0.00 b	0.50 bc	1.50 abc	0.08 cd	0.24 ab	1.50
Beleaf 50 SG	5.6	0.00	0.25	0.25	1.00	0.00 b	0.50 bc	0.50 c	0.33 bcd	0.15 b	0.50
Beleaf 50 SG + Hero 1.25 EC	2.8 + 10.3	0.75	0.00	0.25	0.00	0.00 b	0.00 c	0.00 c	0.00 d	0.00 b	0.00
Cobalt	32.0	0.50	0.75	0.75	0.25	0.00 b	0.00 c	0.50 c	0.00 d	0.00 b	0.50
Lorsban 4E	32.0	0.00	0.00	0.50	0.00	0.00 b	0.00 c	2.25 abc	0.48 ab	0.08 b	1.75
Warrior 1 CS	3.84	0.00	0.00	1.00	0.25	0.00 b	0.00 c	0.00 c	0.15 bcd	0.12 b	0.75
LSD; *P*=0.05		NS [y]	NS [y]	NS [y]	NS [y]	0.67	0.73	2.25	0.34	0.35	NS [y]

Means within columns followed by the same letter are not significantly different; $LSD_{0.05}$.
[y] Not significant by ANOVA; *P*=0.05.
[z] Log 10^x transformed data used for analysis.

Table 7. Stink Bug Adults per Sweeps in Seed Alfalfa. Holtville, CA. 2008.

Treatment	oz/acre	19 May	29 May	2 Jun	9 Jun	13 Jun	16 Jun	24 Jun	30 Jun	7 Jul ^{z}	14 Jul
Untreated	--------	0.00	0.00	0.00	3.25	1.50	2.25	3.75	2.50	0.52 ab	0.75
Carzol 92 SP*	17.4	0.00	0.00	0.00	5.00	0.50	1.25	1.25	0.75	0.27 abc	0.25
Rimon	12.0	0.25	0.00	0.00	0.50	0.75	1.25	2.75	1.25	0.31 abc	0.50
Rimon 0.83EC f/b Lorsban 4E	12.0 f/b 32.0	0.00	0.00	0.00	2.75	0.00	1.00	3.50	1.75	0.17 bc	1.50
NAI-2302 15EC	27.0	0.00	0.00	0.00	3.25	1.50	1.75	4.50	1.50	0.46 ab	2.75
NNI-0101 20SC	6.37	0.50	0.00	0.00	1.75	2.25	1.75	1.75	4.00	0.61 a	0.75
Beleaf 50 SG	2.8	0.00	0.00	0.00	3.50	1.00	2.25	2.50	1.00	0.37 ab	1.75
Beleaf 50 SG	5.6	0.00	0.00	0.25	2.75	2.00	2.75	1.25	0.25	0.30 abc	0.50
Beleaf 50 SG + Hero 1.25 EC	2.8 + 10.3	0.00	0.00	0.00	3.00	0.00	0.25	0.50	1.25	0.00 c	1.00
Cobalt	32.0	0.00	0.00	0.00	1.25	0.00	1.50	0.75	1.00	0.39 ab	0.75
Lorsban 4E	32.0	0.00	0.25	0.00	1.25	1.50	0.75	4.75	1.75	0.27 abc	0.25
Warrior 1 CS	3.84	0.00	0.00	0.00	3.50	0.25	1.25	2.75	1.75	0.53 a	0.50
LSD; *P*=0.05		NS ^{y}	NS ^{y}	NS ^{y}	NS ^{y}	NS ^{y}	NS ^{y}	NS ^{y}	NS ^{y}	0.35	NS ^{y}

Means within columns followed by the same letter are not significantly different; $LSD_{0.05}$.
^{y} Not significant by ANOVA; *P*=0.05.
^{z} Log 10^{x} transformed data used for analysis.

Table 8. Stink Bug All Stages per Sweeps in Seed Alfalfa. Holtville, CA. 2008.

Treatment	oz/acre	19 May	29 May	2 Jun	9 Jun	13 Jun	16 Jun	24 Jun	30 Jun [z]	7 Jul [z]	14 Jul
Untreated	--------	0.25	0.25	0.50	3.25	2.50	4.00 a	6.00 abc	0.66 abc	0.68 abc	2.25
Carzol 92 SP*	17.4	0.00	0.25	1.00	5.00	0.50	1.50 bcd	2.00 cde	0.19 d	0.38 cd	0.75
Rimon	12.0	0.50	0.00	0.25	0.50	0.75	1.25 bcd	3.25 abcde	0.52 bcd	0.35 cde	0.50
Rimon 0.83EC f/b Lorsban 4E	12.0 f/b 32.0	0.00	0.00	0.25	2.75	0.00	1.00 cd	4.25 abcde	0.49 bcd	0.30 de	2.25
NAI-2302 15EC	27.0	0.25	0.00	0.25	3.25	2.00	1.75 bcd	7.50 a	0.46 bcd	0.72 ab	3.75
NNI-0101 20SC	6.37	0.50	0.50	0.75	4.00	3.00	2.50 abc	5.00 abcd	1.00 a	0.94 a	2.25
Beleaf 50 SG	2.8	0.00	0.00	0.75	3.50	1.00	2.75 abc	4.00 abcde	0.27 d	0.48 bcd	3.25
Beleaf 50 SG	5.6	0.00	0.25	0.50	3.75	2.00	3.25 ab	1.75 cde	0.37 bcd	0.39 bcd	1.00
Beleaf 50 SG + Hero 1.25 EC	2.8 + 10.3	0.75	0.00	0.25	3.00	0.00	0.25 d	0.50 e	0.30 cd	0.00 e	1.00
Cobalt	32.0	0.50	0.75	0.75	1.50	0.00	1.50 bcd	1.25 de	0.24 d	0.39 bcd	1.25
Lorsban 4E	32.0	0.00	0.25	0.50	1.25	1.50	0.75 cd	7.00 ab	0.71 ab	0.30 de	2.00
Warrior 1 CS	3.84	0.00	0.00	1.00	3.75	0.25	1.25 bcd	2.75 bcde	0.38 bcd	0.59 bcd	1.25
LSD; *P*=0.05		NS [y]	NS [y]	NS [y]	NS [y]	NS [y]	2.22	4.42	0.39	0.35	NS [y]

Means within columns followed by the same letter are not significantly different; $LSD_{0.05}$.
[y] Not significant by ANOVA; *P*=0.05.
[z] Log 10^x transformed data used for analysis.

Table 9. Percentages of Damaged Seed from Lygus Bug, Stink Bug, Alfalfa Seed Chalcid and Water and Percentages of Green Seed and Healthy Seed. Holtville, CA, 2008.

Treatment	oz/acre	Lygus	Stink Bug	Seed Chalcid	Water	Green Seed	Good Seed
Untreated	--------	19.75 a	5.25 a	3.00	0.00	8.50	63.50 c
Carzol 92 SP	17.4	7.75 c	4.25 abc	0.75	0.00	3.00	84.25 a
Rimon	12.0	8.25 c	3.75 abcd	0.75	0.00	6.75	80.50 ab
Rimon 0.83EC f/b Lorsban 4E	12.0 f/b 32.0	9.25 c	3.25 abcde	1.00	1.00	6.50	79.00 ab
NAI-2302 15EC	27.0	12.00 bc	1.50 e	1.25	0.00	4.25	80.75 ab
NNI-0101 20SC	6.37	16.50 ab	4.50 ab	2.00	0.00	7.00	70.00 bc
Beleaf 50 SG	2.8	9.50 c	2.50 bcde	0.75	0.25	6.25	80.75 ab
Beleaf 50 SG	5.6	9.50 c	1.75 de	1.50	0.00	1.00	86.25 a
Beleaf 50 SG + Hero 1.25 EC	2.8 + 10.3	9.25 c	2.25 cde	0.25	0.50	5.50	82.25 a
Cobalt	32.0	10.75 bc	2.75 bcde	0.75	0.00	2.00	83.75 a
Lorsban 4E	32.0	12.75 bc	2.00 de	0.75	0.25	4.75	79.50 ab
Warrior 1 CS	3.84	11.00 bc	2.75 bcde	2.00	0.25	1.50	82.50 a
LSD; *P*=0.10		6.20	2.07	NS [y]	NS [y]	NS [y]	11.65

Means within columns followed by the same letter are not significantly different; $LSD_{0.10}$.
[y] Not significant by ANOVA; *P*=0.10.
[z] Log 10^x transformed data used for analysis.

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 April 1 to June 30 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	April		May		June	
	1-15	15-30	1-15	16-31	1-15	16-30
Calipatria	0.26	0.29	0.32	0.36	0.39	0.40
El Centro (Seeley)	0.24	0.28	0.31	0.34	0.36	0.38
Holtville (Meloland)	0.25	0.28	0.32	0.35	0.38	0.39

* Irrigation Management Unit, Imperial Irrigation District.