# *Imperial* AGRICULTURAL BRIEFS


***October* 2004**


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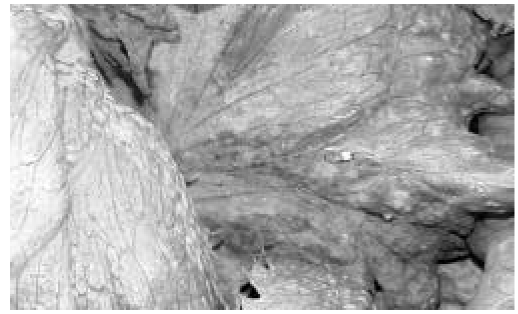
## Comparison of Fungicides for Control of Powdery Mildew on Iceberg Lettuce, 2004

**Thomas A. Turini**



Fungicide efficacy against powdery mildew on lettuce was compared in a study conducted at the University of California Desert Research and Extension Center near Holtville, CA. On 20 November 2003, 'Coyote' iceberg lettuce was sown in two seed lines per bed and irrigated. On 10, 20 March and 5 April, materials were applied. MicroCide was applied 23 January, 1, 10, 20 February and 5 April. All materials were applied at 30 gallons of spray volume per acre with a $CO_2$-pressurized backpack sprayer at 30 psi. A 2-nozzle spray boom was used with Teejet 8002 flat fan nozzles spaced 20-in apart. On 6 April, powdery mildew severity was rated according to the following scale on each of 10 plants per plot: 1 = no powdery mildew observed; 2 = powdery mildew on lower wrapper leaves only; 3 = powdery mildew on upper wrapper leaves; 4 = powdery mildew on cap leaf; 5 = extensive powdery mildew on the entire plant. Disease severity was analyzed with ANOVA. Least significant difference (P=0.05) is reported.

Powdery mildew severity levels were sufficient for treatment differences to be obvious. Under the conditions of this study, all materials tested except for MicroCide (fish oil extract) provided excellent control of powdery mildew. No phytotoxicity was observed.

Note that many of the pesticides listed here are not currently registered for use on lettuce. Check labels before writing recommendations for treatment.

| Treatment [x] | Powdery mildew severity rating[y] |
|---|---|
| Flint 2.0 oz………………………………………………………………................ | 1.0 |
| Procure 8.0 oz/ac……………………………………………………………… | 1.0 |
| Quintec 12.0 fl oz……………………………………………………………... | 1.1 |
| Cabrio 16.0 oz + Latron B-1966 0.06 %........................................................ | 1.2 |
| Quadris 15.3 fl oz + Laton b-1956……………………………………………… | 1.2 |
| Quintec 6.0 fl oz…………………………………………………………….... | 1.2 |
| Microthiol Special 6.0 lbs…………………………………………………….. | 1.6 |
| MicroCide as formulated[z]…………………………………………………….. | 3.4 |
| Procure 6.0 oz/ac……………………………………………………………… | 1.0 |
| Untreated……………………………………………………………………… | 3.8 |
| LSD (P=0.005) | 0.815 |

[x] On 10, 20 March and 5 April 2004, materials were applied. All materials were applied at 30 gallons spray volume per acre with a CO2 pressurized backpack sprayer at 30 psi.

[y] On 6 April 2004, powdery mildew severity was rated according to the following scale on each of 10 plants per plot: 1 = no powdery mildew observed; 2 = powdery mildew on lower wrapper leaves only; 3 = powdery mildew on upper wrapper leaves; 4 = powdery mildew on cap leaf; 5 = extensive powdery mildew on the entire plant.

[z] MicroCide was applied 23 January, 1, 10, 20 February and 5 April.

**Summary of the 2003 Imperial County Agricultural Crop Report**

**Herman Meister & Khaled Bali**

## Field Crops

There was a decrease of $28 million in gross value of Imperial County field crops for 2003 as compared to the gross return in 2002. This figure represents a 10.5 % decrease ($244,528,000 in 2003 vs. $272,901,000 in 2002). 2003 field crop gross values are the lowest that they have been since 1993. The majority of the overall loss can be attributed to lower alfalfa prices. The lower prices for alfalfa resulted in $40 million less income to alfalfa growers in 2003 as compared to the value in 2002. All of the other crops with the exception of pasture and baled straw showed increases on a value per acre basis. Specifically, bermudagrass hay (3.6%), cotton lint (12.5%), cotton seed (25.8%), kleingrass (8.6%), pasture (-16.5%) baled straw (-14.0%), sudangrass (9.5%), sugar beets (9.4%), wheat (12.8%), and miscellaneous field crops (18.2%).

## Vegetable Crops

There was a decrease of 16.55% in the gross value of vegetable and melon crops in 2003 as compared to 2002 ($442,928,000 in 2003 vs. $530,769,000 in 2002). This difference is due to unusually high revenues in 2002. In 2002, growers reacted to the 9/11 terrorist attacks by planting less acreage. In addition, the winter of 2002 was colder than normal, which curtailed shipments even more. These two factors resulted in higher than normal returns to the grower in 2002. The average gross value for vegetable and melon crops during last five years was $444,745,400. The gross value of $442,928,000 in 2003 is very close to this average.

The following crops showed decreases in gross value from 2002 to 2003; asparagus-32%, broccoli-18%, caulioflower-27%, iceberg lettuce-62%, leaf lettuce-0.5%, dehy onions-9%, potatoes-36%, spinach-33%, carrots-7%, miscellaneous vegetables-5%. The crops that showed increases in gross value from 2002 to 2003 were; cantaloupes-12%, cabbage-14%, mixed melons-56%, onions-54%, sweet corn-38%, and watermelons-23%.

## Evaluation of Foliar Insecticides for Whitefly Control in Broccoli

**Eric T. Natwick**

A field trial was conducted at the University of California Desert Research and Extension Center near Holtville, CA to look at foliar insecticide applications for efficacy against silverleaf whitefly on broccoli, variety Captain, planted September 22 and sprinkled September 23 - 29, 2003. The experimental design was a randomized complete block with four replicates. Plots measured 50 ft by 13.33 ft; 4 beds per plot on 40 in. centers. Foliar sprays were applied at 53 gpa at 35 psi using a Spider Trac Sprayer with three TJ-60 11003VS nozzles per bed. All foliar treatments included an adjuvant (Latron CS-7) at 0.125 % (v / v). Insecticide treatments were applied on October 14, 21, November 5 and 18, 2003. Insecticide treatments and rates of application are listed in Table 1. Evaluations were made by counting the numbers of whitefly adults on basal leaves of ten plants in each plot weekly during October and November. Whitefly eggs and nymphs were counted within 1.65 $cm^2$ leaf disks from basal leaves from ten plants in each plot weekly during October and November using a binocular microscope.

All insecticide treatments had significantly fewer silverleaf whitefly adults compared to the untreated control (ANOVA, $P < 0.05$) (Table 1). Assail 70 WP at 1.7 ounces per acre had significantly fewer whitefly adults than all other insecticide treatments except Assail 70 WP at 0.8 ounces per acre tank mixed with Mircothiol 80DF at 80 ounces per acre. Assail 70 WP at 0.8 ounces per acre tank mixed with Mircothiol 80DF at 80 ounces per acre had significantly fewer whitefly adults than Provado 1.6 F at 3.0 and 3.8 ounces per acre.

All insecticide treatments had significantly fewer silverleaf whitefly eggs compared to the untreated control (ANOVA, $P < 0.05$) (Table 1). Assail 70 WP at 1.7 ounces per acre had significantly fewer whitefly eggs than all other insecticide treatments. Assail 70 WP at 0.8 ounces per acre tank mixed with Mircothiol 80DF at 80 ounces per acre had significantly fewer whitefly adults than Provado 1.6 F at 3.0 ounces per acre.

All insecticide treatments had significantly fewer silverleaf whitefly nymphs compared to the untreated control (ANOVA, $P < 0.05$) (Table 1). Assail 70 WP at 1.7 ounces per acre and Assail 70 WP at 0.8 ounces per acre tank mixed with Mircothiol 80DF at 80 ounces per acre had significantly fewer whitefly nymphs than all other insecticide treatments.

All insecticide treatments had significantly taller plants on December 1, 2003 (ANOVA, $P < 0.05$) measured as canopy height in inches (Table 2). The canopy height was greatest for the treatments with the fewest whitefly adults and nymphs (Tables 1 and 2). Although there were no significant differences in the overall yield among the treatments, the treatments with the fewest whitefly adults and nymphs produced an earlier crop that treatments with higher numbers of whiteflies.

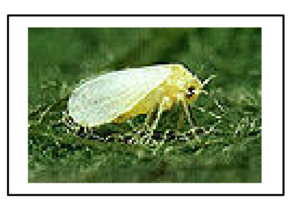


**Table 1. Post treatment means for Adult Whitefly per Leaf and for Whitefly Eggs and Nymphs per $cm^2$ of leaf Following Various Insecticide Treatments In Broccoli, Holtville, CA, 2003.**

| Treatment | lb(AI)/acre | oz/acre | Adults [z] | Eggs [z] | Nymphs [z] |
|---|---|---|---|---|---|
| Untreated | ------ | ------- | 21.5 a | 31.6 a | 59.4 a |
| Actara 25 WG | 0.05 | 3.0 dry | 13.6 bc | 11.4 bc | 24.8 b |
| Actara 25 WG | 0.06 | 4.0 dry | 13.8 bc | 11.8 bc | 26.6 b |
| Provado 1.6 F | 0.05 | 3.0 fl | 15.4 b | 13.2 b | 26.0 b |
| Provado 1.6 F | 0.06 | 3.8 fl | 15.6 b | 11.4 bc | 24.7 b |
| Assail 70 WP | 0.074 | 1.7 dry | 10.7 d | 7.6 d | 14.3 c |
| Assail 70 WP + Microthiol 80DF | 0.035 + 4.0 | 0.8 dry + 80.0 dry | 12.9 cd | 10.4 c | 18.1 c |

**Mean separations within columns by $LSD_{0.05.}$ [z] Log transformed data used for analysis; reverse transformed means reported.**

**Table 2. Plant Height in Inches, Number of Marketable Broccoli Heads, and Pounds of Marketable Broccoli Heads Following Soil Injections of Various Insecticides, Holtville, California, 2003/04.**

| Treatment | lb(AI)/acre | Canopy height in inches on 1 Dec | Pounds/0.001 acre | | |
|---|---|---|---|---|---|
| | | | 13 Jan | 21 Jan | Total |
| Untreated | ------ | 14.3 c | 0.7 d | 6.0 a | 6.7 a |
| Actara 25 WG | 0.05 | 17.0 ab | 2.9 c | 2.0 bc | 4.9 a |
| Actara 25 WG | 0.06 | 17.7 ab | 2.8 c | 2.9 b | 5.7 a |
| Provado 1.6 F | 0.05 | 16.2 bc | 3.7 bc | 1.4 c | 5.1 a |
| Provado 1.6 F | 0.06 | 16.5 abc | 3.3 bc | 2.5 bc | 5.9 a |
| Assail 70 WP | 0.074 | 18.6 a | 5.0 a | 1.7 bc | 6.7 a |
| Assail 70 WP + Microthiol 80DF | 0.035 + 4.0 | 17.9 ab | 4.4 ab | 1.9 bc | 6.3 a |

**Mean separations within columns by $LSD_{0.05.}$**

## 2003/2004 Raptor/Pursuit Trial Results

**Herman Meister & Brent Boutwell**

### Introduction

Raptor was registered for use on alfalfa in 2002. During 2002 and 2003, the lack of activity of this herbicide against Mexican sprangletop became apparent. This was noted in early fall applications on newly established alfalfa fields where Mexican Sprangletop was a problem. This situation was not expected since Raptor is strong on grass control.

### Objectives

In an effort to extend the residual weed control spectrum, combinations of Raptor/Pursuit and Raptor/Pursuit/Butoxone were investigated during the 2003/2004 alfalfa hay season. Along with weed control observations, yield information was collected to determine impacts of herbicides and weeds on alfalfa hay production.

### Procedure

The following herbicide combinations were evaluated:

1. Raptor 1E + Pursuit DG 3 oz + 1 oz / A
2. Raptor 1E + Pursuit DG 4 oz + 1 oz / A
3. Pursuit DG + Butoxone 2E 1.25 oz + 2.0 pts. / A (2,4-DB)
4. Raptor 1E + Butoxone 2E 5 oz + 2.0 pts. / A (2,4-DB)
5. Raptor 1E + Pursuit DG + Butoxone 2E 3 oz + 1 oz + 2 pts / A
6. Untreated check

A recently planted (October 2003) alfalfa field southwest of Brawley on the WSM canal was selected for the trial. The alfalfa was in the 2-3 trifoliate leaf stage of growth. The materials were applied on November 21, 2003 with a backpack hand-held boom sprayer in 25 gpa @ 40 psi. Plots were 10 feet wide by 50 feet long and replicated 4 times in a randomized block design. The major weeds present were annual sowthistle, malva, london rocket, goosefoot, and brome grass. Plot ratings were made on December 12 (21 DAT), Figure 1, and January 2 (42 DAT), Figure 2.

### Weed Ratings

Weed ratings were based on a scale of 1 to 10 with 1 indicating “no effect” and 10 indicating weeds are “all dead”. A rating score of 7.5 is generally accepted in the industry as providing economic control. In Figure 1, the bar graph shows no differences between the herbicides on the various weeds, but does show that some weeds were more susceptible. London rocket was the most susceptible with scores of 9 or above for all herbicide treatments, while annual sowthistle, goosefoot, and malva scored in the range of 7. Brome grass showed the least amount of injury (if any) with a score of 2 for each entry.

In Figure 2, all the herbicide combinations provided very good control of London rocket, goosefoot, and malva with scores above 9, 42 days after treatment. The Raptor/Pursuit combination that contained Butoxone provided a significantly higher degree of control of annual sowthistle than did the combinations without Butoxone. None of the herbicide combinations provided successful control of Brome grass.

**Alfalfa Hay Yields**

Alfalfa hay yields were determined by cutting 4 square feet of hay from each plot. The sample was dried in forced air ovens and weighed to determine hay yields. Figures 3, 4, & 5 show the impacts of the weed populations and herbicides on alfalfa hay yields. The February 17th harvest (Figure 3) shows the untreated plot with 3.42 tons of dry matter while the herbicide treatments show close to 2 tons of clean hay. The untreated plots had dense populations of weeds that contributed to the overall dry matter weight. (Photo Figure 6) The actual harvest by the grower was delayed by about 4 weeks due to rain.

The samples for the second cutting were taken on April 23, 2004, and the results are shown in Figure 4. The heavy population of weeds in the untreated plots reduced the alfalfa stand by an estimated 85%. This is reflected in yields of the untreated plots which were reduced by 86%. There were no significant differences in yield between herbicide treatments.

The last yield sample was collected on May 24, 2004 and the results are shown in Figure 5. The herbicide treated plots produced an average of 1.34 tons per acre while the untreated plots produced 0.32 tons per acre, a 76% reduction in yield. There were no significant differences in alfalfa hay yields between the herbicide treated plots.

Thank you!

## Summary

1. All of the tested herbicide treatments were equally effective for the control of london rocket, goosefoot, and malva.
2. The Raptor/Pursuit combination did not control annual sowthistle. The addition of Butoxone (2,4-DB) to Raptor alone, Pursuit alone, or the Raptor/Pursuit combination extended the weed control spectrum to include annual sowthistle (Photo, Figure 7).
3. The test reinforced the need for weed control in newly established alfalfa. At the planned and anticipated harvest date, a 1” rain occurred which delayed the harvest 4 weeks. This allowed the weeds to choke out the alfalfa stand in the untreated plots.
4. Brome grass was not affected by any of the herbicide treatments tested.


## Acknowledgements

We extend our thanks to Jeff McWane Entomological Service, Rich Waegner, Rockwood Chemical Company, Todd Burkdoll, BASF Technical Service Representative, and Tom Gargiulo, Brawley farmer, for their cooperation and support in assisting with this research.

**Fig. 1**
**2003/2004 Raptor/Pursuit Trial**
**December 12, 2003 (21 DAT)**

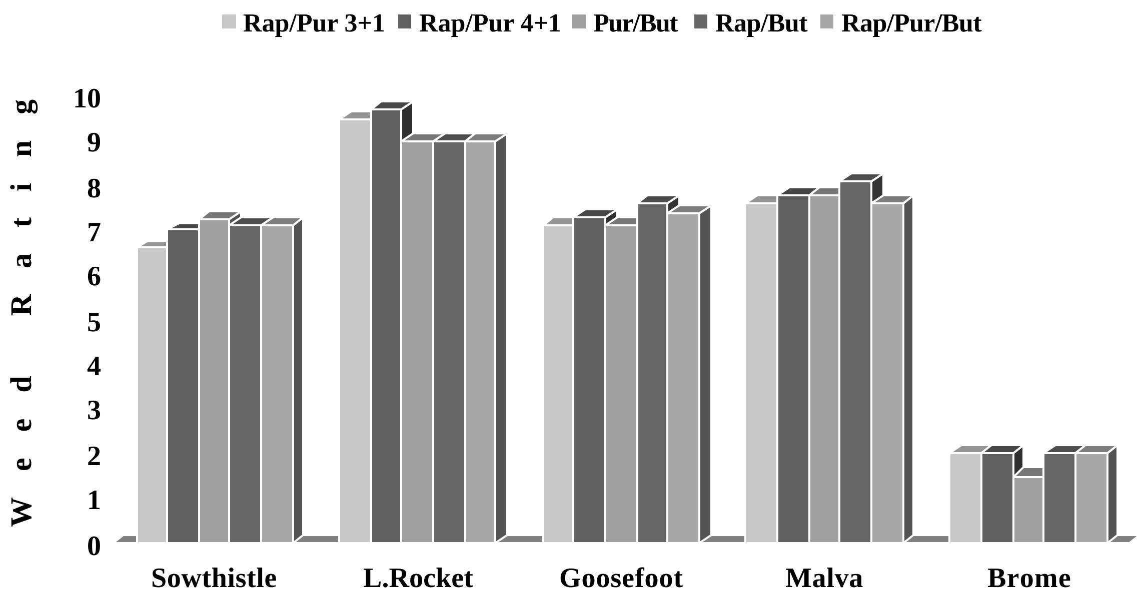



**Fig. 2**
**2003/2004 Raptor/Pursuit Trial**
**January 2, 2004 (42 DAT)**

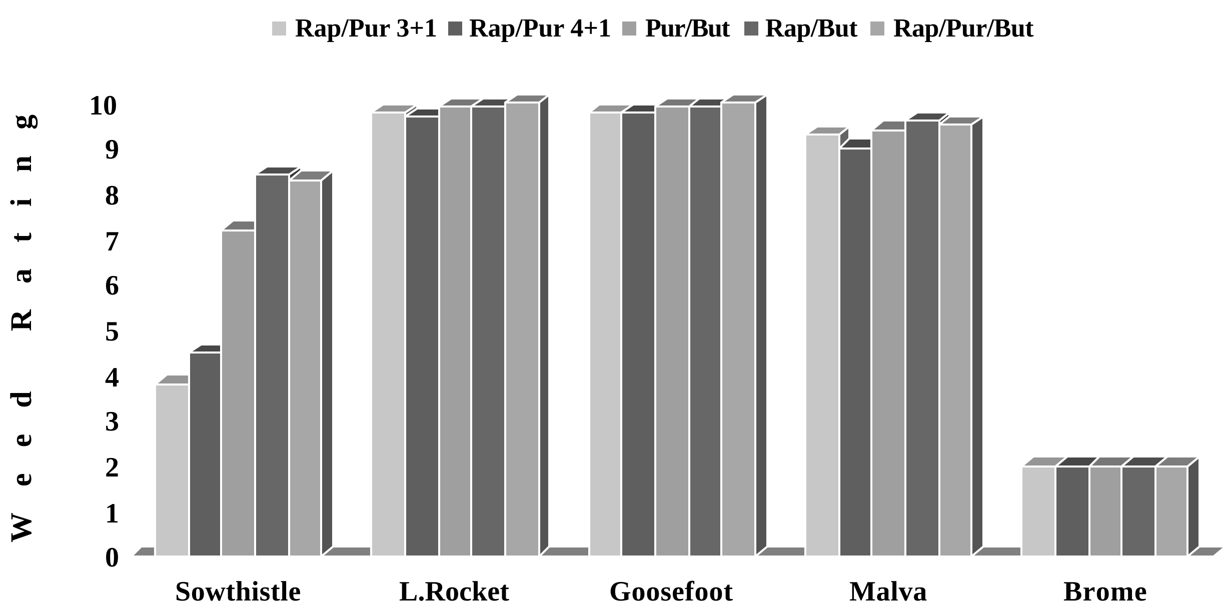


**Fig. 3**
**2003/2004 Raptor/Pursuit Trial**
**Alfalfa Hay Yields**
**February 17, 2004 (90 DAT)**

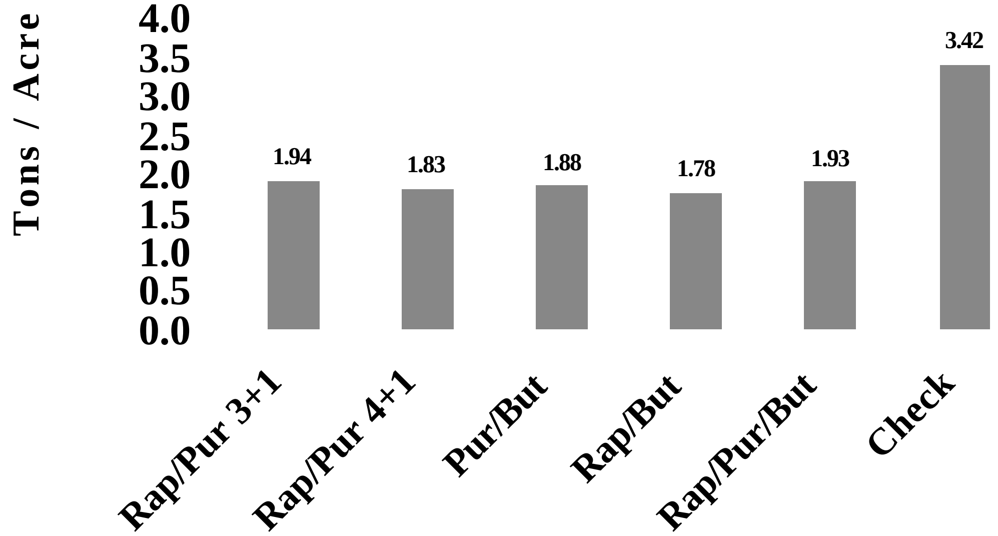



**Fig. 4**
**2003/2004 Raptor/Pursuit Trial**
**Alfalfa Hay Yields**
**April 23, 2004 (2nd cutting)**

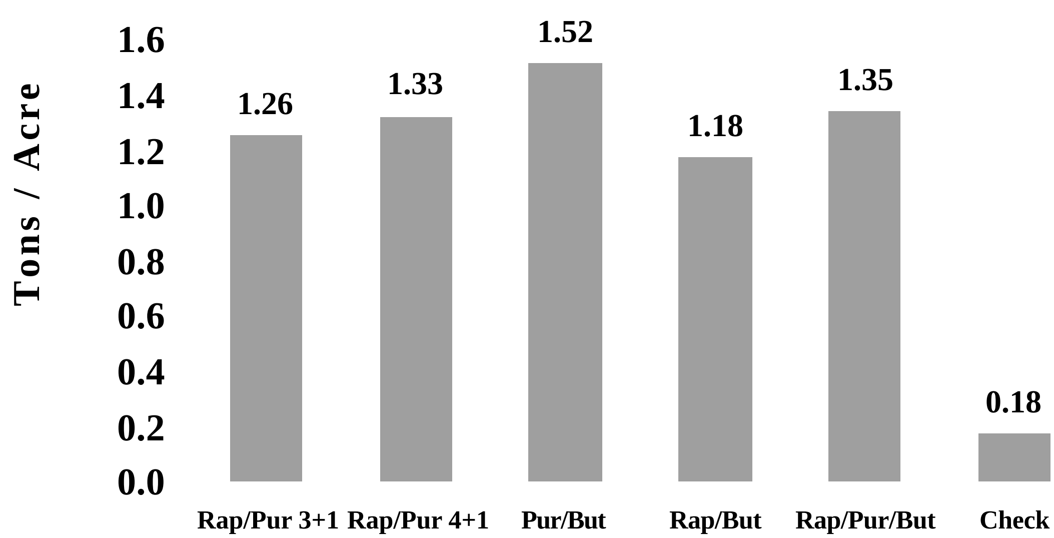


**Fig. 5**
**2003/2004 Raptor/Pursuit Trial**
**Alfalfa Hay Yields**
**May 24, 2004 (3rd Cutting)**

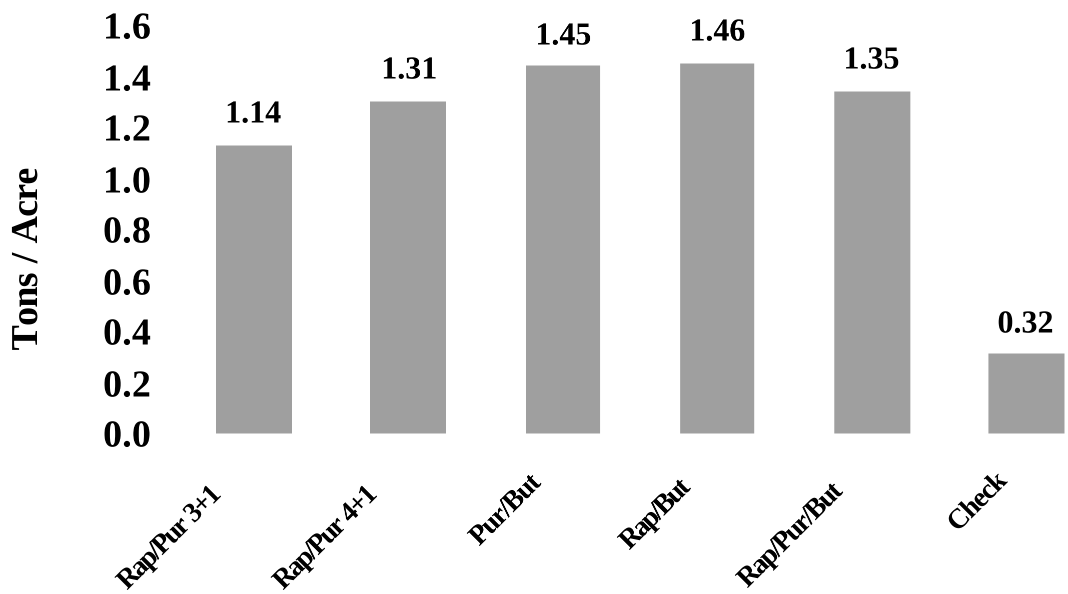
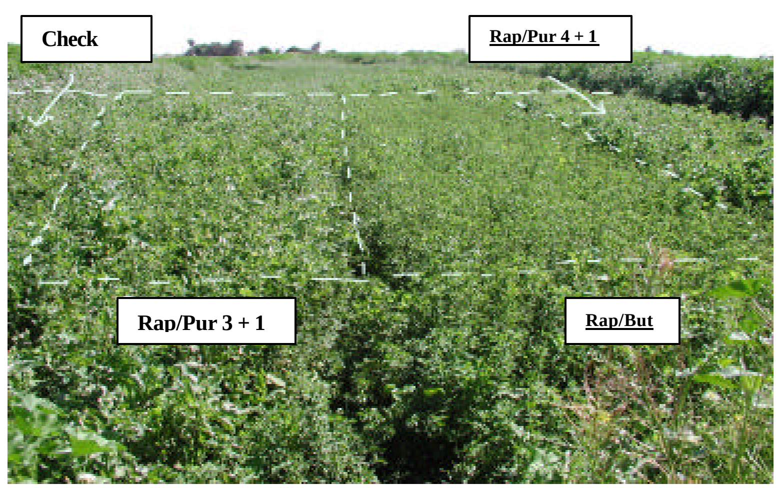



**Figure 6 Rapto/Pursuit Trial**
**February 17, 2004 (90 DAT)**

**Figure 7 Raptor/Pursuit Trial**
**March 16, 2004 (120 DAT)**



## 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 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).

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 at http://tmdl.ucdavis.edu and click on the CIMIS link.

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

| Station | October | | November | | December | |
|---|---|---|---|---|---|---|
| | 1-15 | 16-31 | 1-15 | 15-30 | 1-15 | 16-31 |
| Calipatria | 0.23 | 0.19 | 0.14 | 0.10 | 0.07 | 0.07 |
| El Centro (Seeley) | 0.23 | 0.17 | 0.13 | 0.09 | 0.06 | 0.06 |
| Holtville (Meloland) | 0.23 | 0.18 | 0.13 | 0.10 | 0.06 | 0.06 |

* Irrigation Management Unit, Imperial Irrigation District

# REMINDERS

The new Guidelines for 2004-2005 for both
Field Crops and Vegetable Crops
are now on line!
You are welcome to visit our website for the most up to date figures!
Printed copies, diskettes, or CD's are available in our office or
by mail.
[http://ceimperial.ucdavis.edu](http://ceimperial.ucdavis.edu)

National Alfalfa Symposium
December 13-15, 2004
San Diego, CA
Addressing critical issues for Alfalfa and Other Harvested Forages

*To simplify our information it is sometimes necessary to use trade names of products or equipment. No endorsement of named products is intended nor is criticism implied of similar products, which are not named*

Eric T. Natwick, County Director