Implementation of a Pest Forecasting and Development Program for Deciduous Tree Crops

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Objectives

1. Monitor, on a weekly basis, selected stone fruit and almond orchards for the seasonal flight dynamics of Oriental fruit moth, peach twig borer, omnivorous leafroller, codling moth, San Jose scale, and navel orangeworm.
2. Distribute information to individuals and organizations requesting data. Information will also be available on Scott Johnson's tree fruit web site.
3. Tabulate the information for historical trends and determine the impact of weather patterns on insect activity.

Procedures

At appropriate dates, traps will be placed (2 traps for each species) in various orchards in Fresno, Kings and Tulare counties. These were monitored on a weekly basis and, on each Friday, the information placed on Fresno County Cooperative Extension website. The information was also electronically mailed to individuals requesting information.

Results

Appendices 3-8 present the results of monitoring the six species of pest insects in 2006. The six species include peach twig borer, Oriental fruit moth, codling moth, omnivorous leafroller, navel orange worm, and San Jose scale. Additionally, the degree-day predictions for the subsequent generation biotic are presented in Appendix 1. The daily high and low temperature at the Kearney Ag Center, compared to the 25-year average, is presented in Appendix 2.

Oriental fruit moth traps were placed in February and first moth catch ranged from March 1 (I-5 and Hwy 33) to May 3 in Laton. Flight at the Kearney Ag Center began on April 15. The second flight was more uniform, ranging from May 15 (1-5 and Hwy 33) to June 1 in Laton. The third flight began in early July and the fourth flight in late July (ca July 28), with the exception of the Panoche site that started on August 13.

The Oriental fruit moth flight was the most erratic in recent years. This led to a great deal of confusion in determining both when to place mating disruption dispensers and when to time supplemental sprays.

Peach twig borer traps were placed on April 1. First moth catch was detected on April 6 (Hwy 33 and I-5), April 19 (KAC), April 20 (Laton) and April 27 at Panoche. The second flight began in mid June (Kearney) to late June at Panoche. The third flight initiation was in late July and early August. A fourth flight was begun at KAC, Laton, and Hwy 33 and I-5.

Peach twig borer activity was much more uniform than that of Oriental fruit moth. Projected start dates were quite close to the actual start dates, based on trap catch, for the second and third flights in particular.

Omnivorous learoller traps were also placed in February. First moths were trapped in peaches at KAC on March 15 and the projected second flight was June 6. The actual start of this flight was June 9. The third flight began on July 15, 7 days earlier than the projected flight. The remaining locations (Panoche and Laton) produced similar results to the KAC locations. Although the first moths trapped were very different, the projected dates for additional generations were quite close.

Codling moth was only monitored at the Kearney site. First moth flight began on April 10 and this was almost a month after the normal beginning of codling moth activity. The projected beginning of the second flight was June 9 and the actual start was June 8. The third flight began on July 23, 5 days after the projected date of July 18. Again, actual and projected activity was quite close.

San Jose scale activity was extremely erratic in 2006. Only the Kearney Ag Center and Laton almond sites were able to track male flight in the spring. The KAC site trapped males on April 26, almost 2 months later than normal. The Laton site trapped males on April 13. The projected second flights were June 18 at KAC and June 12 at Laton. The actual trapping occurred slightly earlier, June 7 at KAC and June 6 at Laton. Similarly, the actual and projected flights of the third generation were quite close at both sites.

Certainly, the rainy and cold spring inhibited male scale activity. However, because the projected and actual start of subsequent flights were so close, the weather may have influenced the ability of males to find females, mate and produce crawlers.

Navel orangeworm was trapped at Laton, Panoche, and Hwy 33 at I-5, all in almond orchards. Although navel orangeworm is known to infest fresh fruit, it is considered a more persistent and severe problem in nuts. Navel orangeworm egg laying is monitored instead of male moths. The first eggs were trapped quite late (April 30) at the Laton and Panoche locations. The Hwy 33 and I-5 site recorded eggs on April 28. The projected start of the second egg laying period was within one week of the actual recording of eggs at the Panoche site and on the same day as the projected start at the other two sites. The third egg deposition period was equally close at each of the three sites.

The following figures are the actual trap counts for each of the insect species at each location in 2006. Figure two represents the 2006 high and low temperatures at the Kearney Ag Center compared to the 25-year average.

The information gathered from this year's monitoring will be compiled with previous years monitoring for use in interpreting the meaning of trap catch in relation to weather patterns. The information is meant to provide a guide on what level of insect trap catch to expect in years of extreme temperatures.

PHENOLOGY INDICATORS FOR PESTS AT SELECTED LOCATIONS
2006

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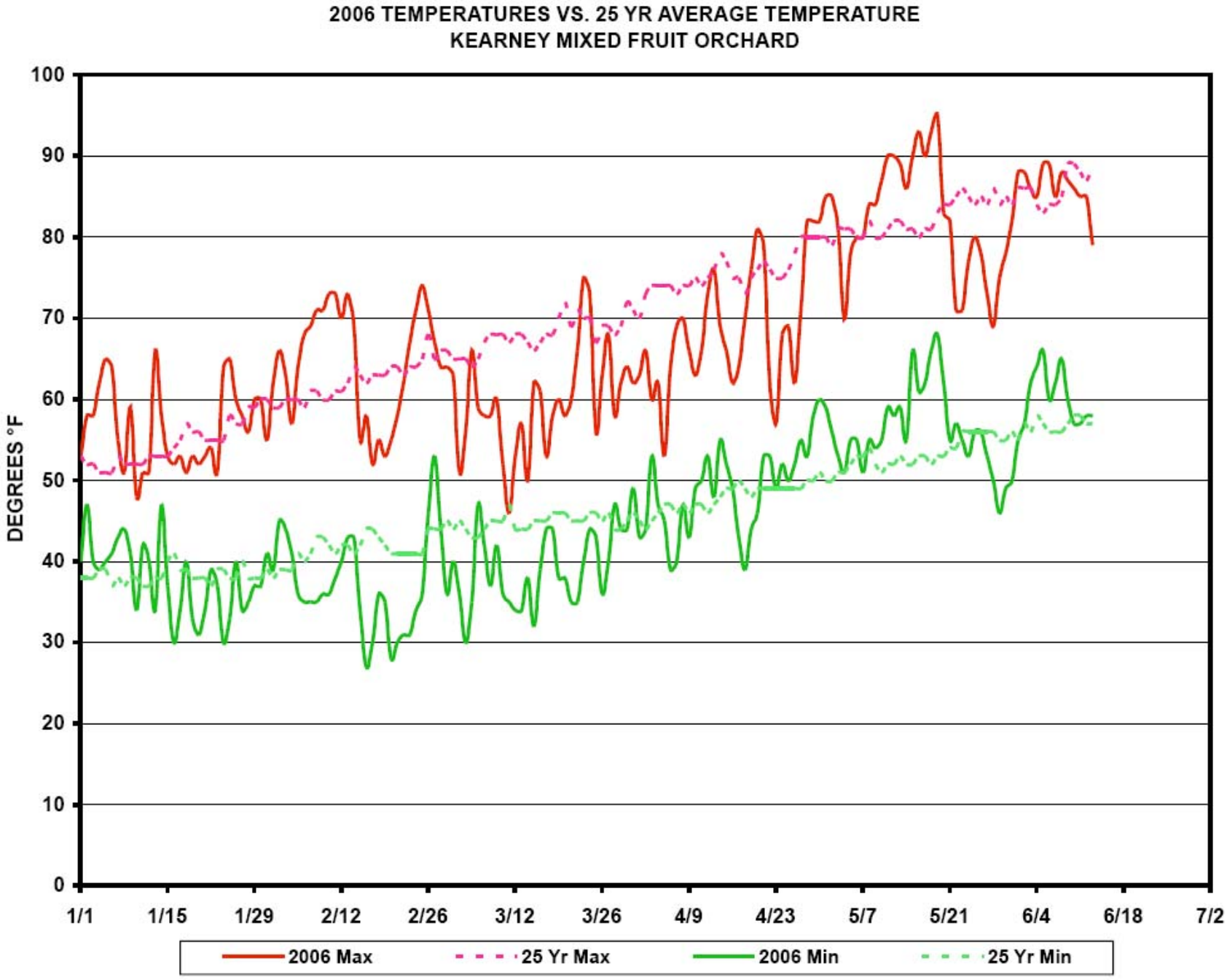
Latest Update: 23-Aug

Pest/Location	°Ds Since Last Biofix	1ST FLIGHT Actual Start	1ST FLIGHT Treatment Interval Onset	1ST FLIGHT Treatment Interval End	2ND FLIGHT Projectd Start	2ND FLIGHT Actual Start	2ND FLIGHT Treatment Interval Onset	2ND FLIGHT Treatment Interval End	3RD FLIGHT Projectd Start	3RD FLIGHT Actual Start	3RD FLIGHT Treatment Interval Onset	3RD FLIGHT Treatment Interval End	4TH FLIGHT Projectd Start	4TH FLIGHT Actual Start	4TH FLIGHT Treatment Interval Onset	4TH FLIGHT Treatment Interval End	5th Flight Projectd Start	5th Flight Actual Start
Peach Twig Borer			400°Ds	500 °Ds			400°Ds	500 °Ds			400°Ds	500 °Ds			400°Ds	500 °Ds		
KAC Mixed Fruit	222	19-Apr	13-May	17-May	13-Jun	10-Jun	26-Jun	29-Jun	19-Jul	13-Jul	26-Jul	29-Jul	20-Aug	14-Aug	30-Aug	3-Sep	28-Sep	
Laton Almonds	193	20-Apr	13-May	17-May	13-Jun	20-Jun	4-Jul	8-Jul	27-Jul	19-Jul	1-Aug	5-Aug	28-Aug	15-Aug	31-Aug	4-Sep	28-Sep	
Panoche Almonds	1233	27-Apr	17-May	23-May	21-Jun	25-Jun	10-Jul	14-Jul	2-Aug		19-Aug	23-Aug	19-Sep		10-Oct	17-Oct		
I-5 & Hwy 33 Almnds	177	16-Apr	12-May	16-May	13-Jun	12-Jun	27-Jun	1-Jul	21-Jul	14-Jul	26-Jul	30-Jul	21-Aug	16-Aug	1-Sep	5-Sep	30-Sep	
Codling Moth			200°Ds	300 °Ds	400 °Ds		200°Ds	300 °Ds	400 °Ds		200°Ds	300 °Ds	400 °Ds		200°Ds	300 °Ds		
KAC Mixed Fruit	827	10-Apr	29-Apr	4-May	10-May	9-Jun	8-Jun	17-Jun	21-Jun	24-Jun	18-Jul	23-Jul	29-Jul	2-Aug	6-Aug	1-Sep		9-Sep	14-Sep	
Oriental Fruit Moth			500°Ds	600 °Ds			500°Ds	600 °Ds					400°Ds	500 °Ds			400°Ds	500 °Ds		
KAC Mixed Fruit	804	15-Apr	11-May	14-May	29-May	31-May	17-Jun	21-Jun	1-Jul	?	?	?	29-Jul	28-Jul	10-Aug	13-Aug	28-Aug	
Laton Almonds	1357	3-May	20-May	25-May	8-Jun	1-Jun	19-Jun	22-Jun	2-Jul	12-Jul	23-Jul	26-Jul	10-Aug		22-Aug	26-Aug	10-Sep	
Panoche Almonds	274	28-Mar	3-May	8-May	22-May	2-Jun	20-Jun	23-Jun	4-Jul	?	?	?	2-Aug	13-Aug	27-Aug	31-Aug	17-Sep	
I-5 & Hwy 33 Almnds	694	1-Mar	24-Apr	29-Apr	14-May	15-May	4-Jun	7-Jun	21-Jun	1-Jul	13-Jul	16-Jul	28-Jul	31-Jul	13-Aug	16-Aug	1-Sep	
Omnivorous Leafroller			700°Ds	900 °Ds			700°Ds	900 °Ds			500 °Ds	700 °Ds	900 °Ds			500°Ds	700 °Ds		
KAC Mixed Fruit	1147	15-Mar*	13-May	21-May	6-Jun	9-Jun	3-Jul	10-Jul	22-Jul	15-Jul	30-Jul	6-Aug	13-Aug	27-Aug		15-Sep	24-Sep	24-Oct	
Laton Grapes	1193	1-Mar*	11-May	18-May	4-Jun	2-Jun	28-Jun	5-Jul	18-Jul	12-Jul	28-Jul	4-Aug	11-Aug	13-Aug		13-Sep	21-Sep	18-Oct	
Panoche Grapes	2020	25-Feb*	11-May	19-May	6-Jun	10-Jun*	6-Jul	13-Jul	24-Jul		12-Aug	20-Aug	28-Aug	13-Sep		6-Oct	18-Oct		
San Jose Scale			600°Ds	700 °Ds			600°Ds	700 °Ds				600°Ds	700 °Ds			600°Ds	700 °Ds		
KAC Mixed Fruit	776	26-Apr	27-May	1-Jun	18-Jun	7-Jun	30-Jun	4-Jul	17-Jul	24-Jul		16-Aug	20-Aug	3-Sep		1-Oct	7-Oct	5-Nov	
Laton Almonds	1000	13-Apr	19-May	25-May	12-Jun	6-Jun	30-Jun	4-Jul	18-Jul	16-Jul		6-Aug	10-Aug	25-Aug		19-Sep	23-Sep	12-Oct	
Panoche Almonds	543					4-Jun	29-Jun	3-Jul	17-Jul	29-Jul		26-Aug	30-Aug	16-Sep		24-Oct	3-Nov		
I-5 & Hwy 33 Almnds	1942					11-Jun	4-Jul	8-Jul	20-Jul			11-Aug	15-Aug	29-Aug		25-Sep	30-Sep	21-Oct	
Navel Orangeworm			100°Ds	200 °Ds		Actual	100°Ds	200 °Ds	750 °Ds	Actual	100°Ds	200 °Ds	750 °Ds	Actual				
Laton Almonds	179	30-Apr	6-May	12-May	29-Jun	29-Jun	3-Jul	8-Jul	29-Jul	14-Aug	19-Aug	24-Aug	20-Sep					
Panoche Almonds	448	30-Apr	8-May	14-May	4-Jul	26-Jun	30-Jun	4-Jul	26-Jul	29-Jul	3-Aug	8-Aug	9-Sep					
I-5 & Hwy 33 Almnds	500	26-Apr	3-May	10-May	28-Jun	28-Jun	2-Jul	7-Jul	26-Jul	30-Jul	4-Aug	8-Aug	4-Sep					
Oblique-Banded Leafroller			600 °Ds	1000 °Ds			600 °Ds	1000 °Ds			600 °Ds	1000 °Ds			600 °Ds	1000 °Ds		
Laton Almonds	823	9-May*	8-Jun	30-Jun	26-Jul	15-Jul	20-Aug	11-Sep	1-Oct		27-Oct							
Panoche Almonds	703	10-May*	8-Jun	30-Jun	25-Jul	16-Jul	18-Aug	8-Sep	29-Sep		28-Oct							
I-5 & Hwy 33 Almnds	601	1-May*	1-Jun	22-Jun	20-Jul	17-Jul	23-Aug	13-Sep	5-Oct		2-Nov							

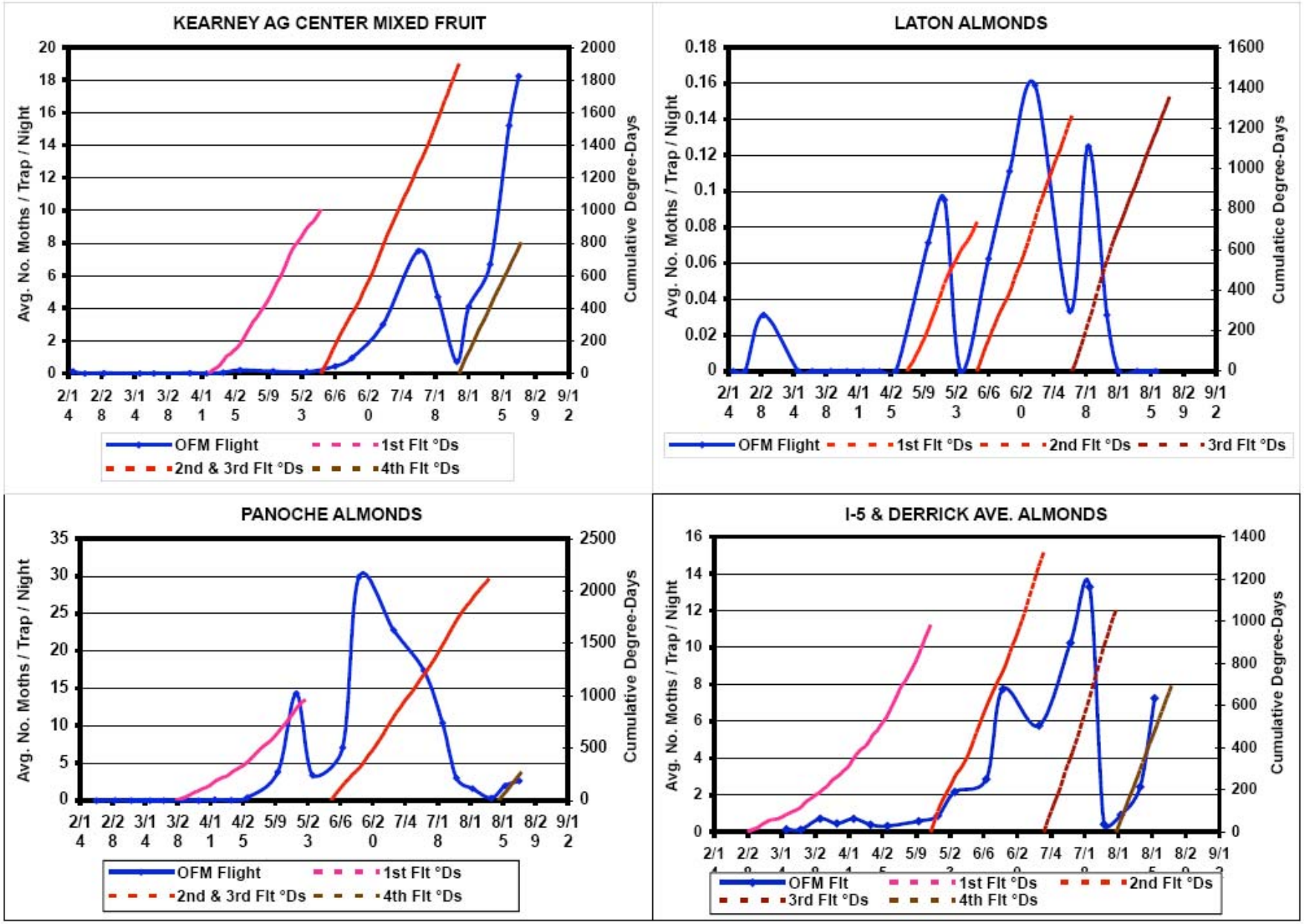
*Estimated

These data are also available on the internet at: http://cefresno.ucdavis.edu/Entomology/

Red numbers and dates are changes from the last update.
— Means the flights are over for the season


2006 TEMPERATURES VS. 25 YR AVERAGE TEMPERATURE
KEARNEY MIXED FRUIT ORCHARD
DEGREES °F
100
90
80
70
60
50
40
30
20
10
0
1/1
1/15
1/29
2/12
2/26
3/12
3/26
4/9
4/23
5/7
5/21
6/4
6/18
7/2
2006 Max
25 Yr Max
2006 Min
25 Yr Min

2006 ORIENTAL FRUIT MOTH FLIGHTS



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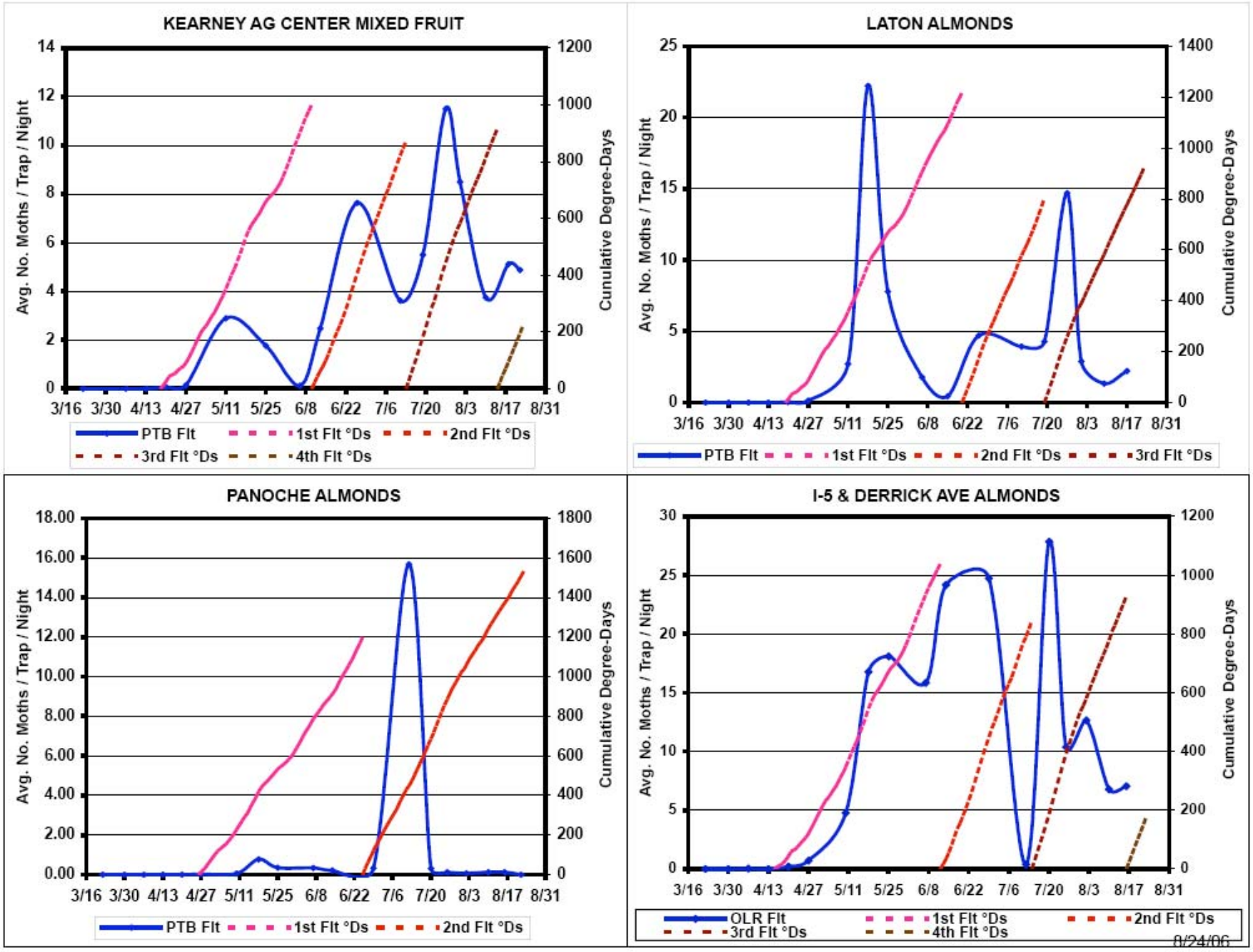
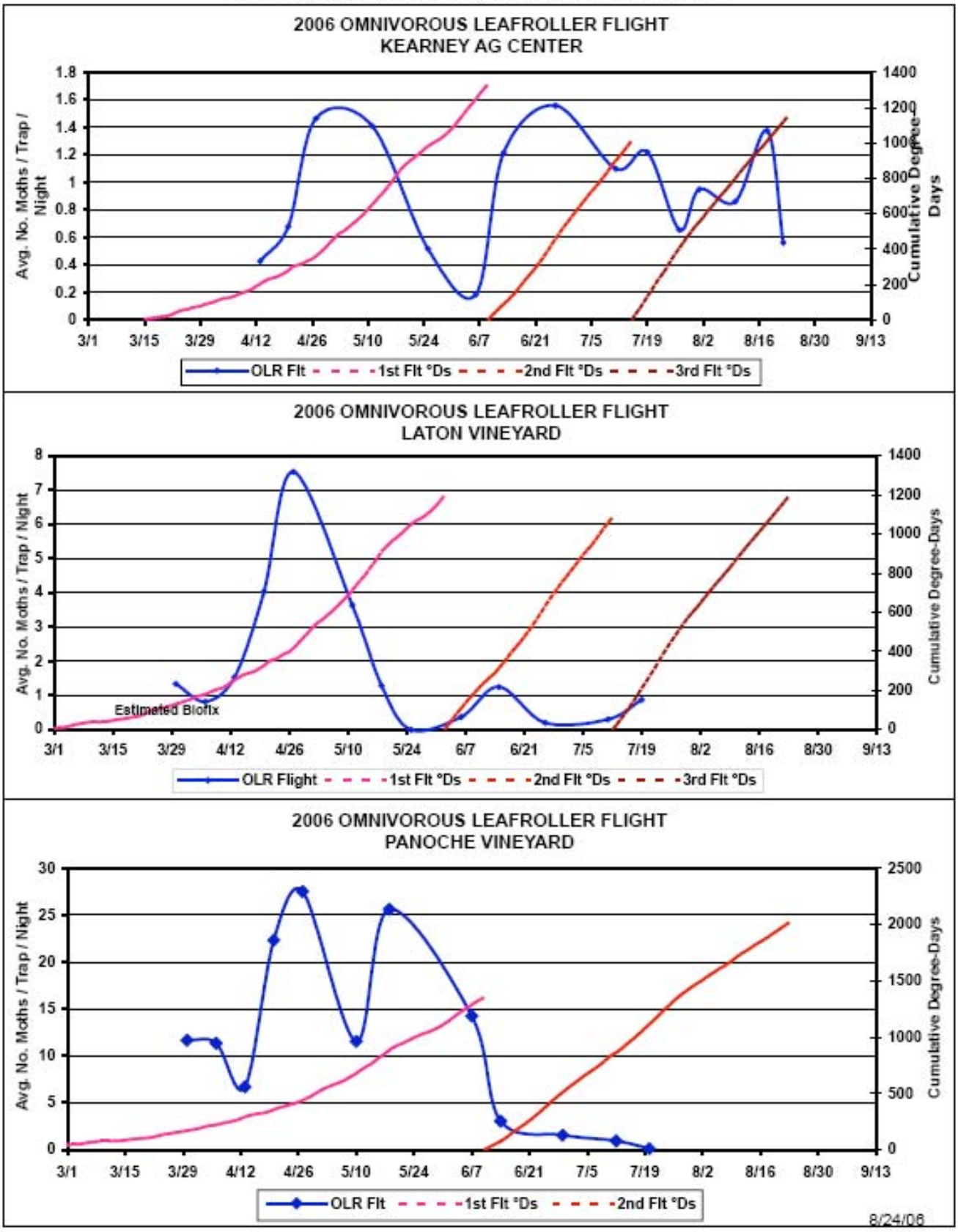
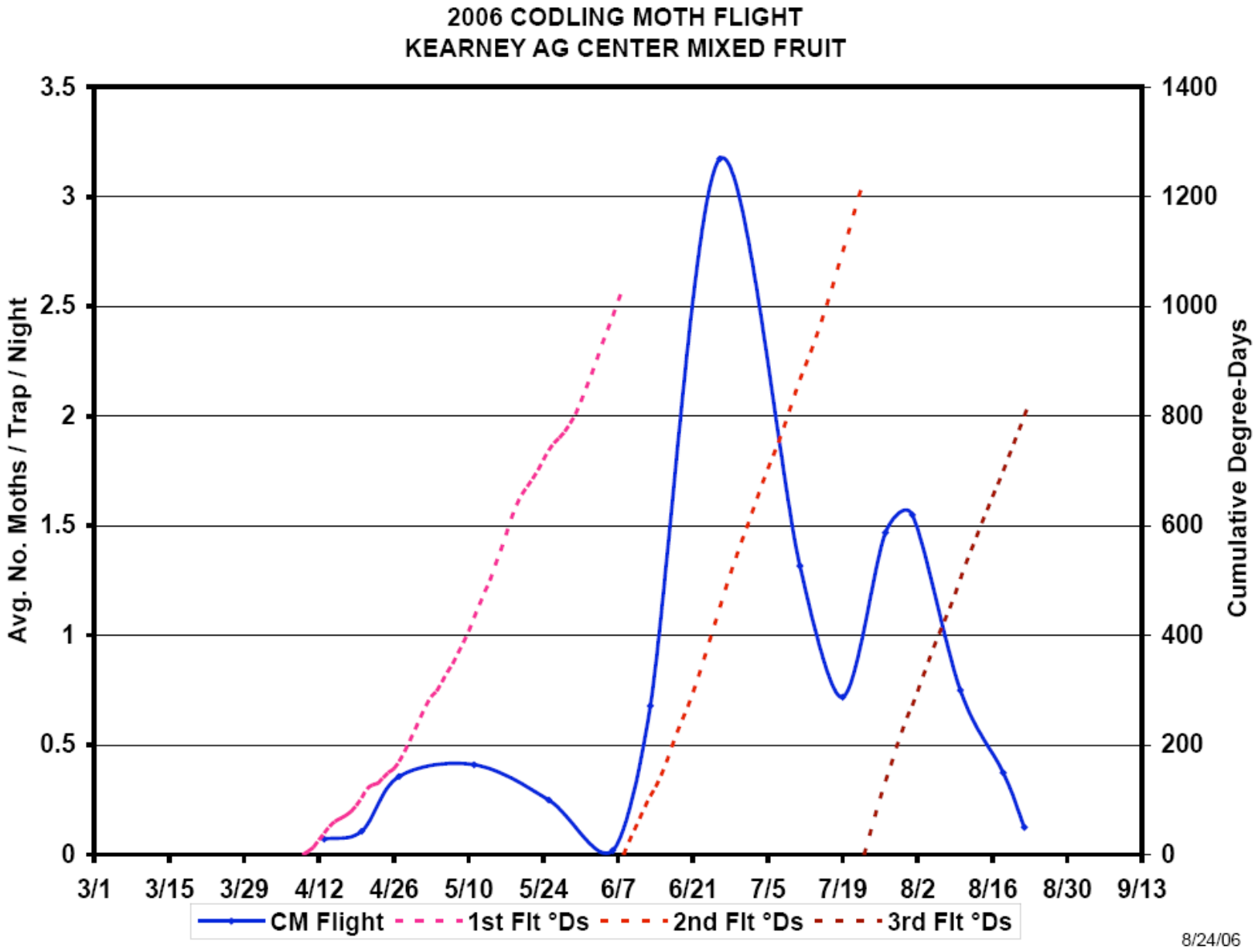
2006 PEACH TWIG BORER FLIGHTS

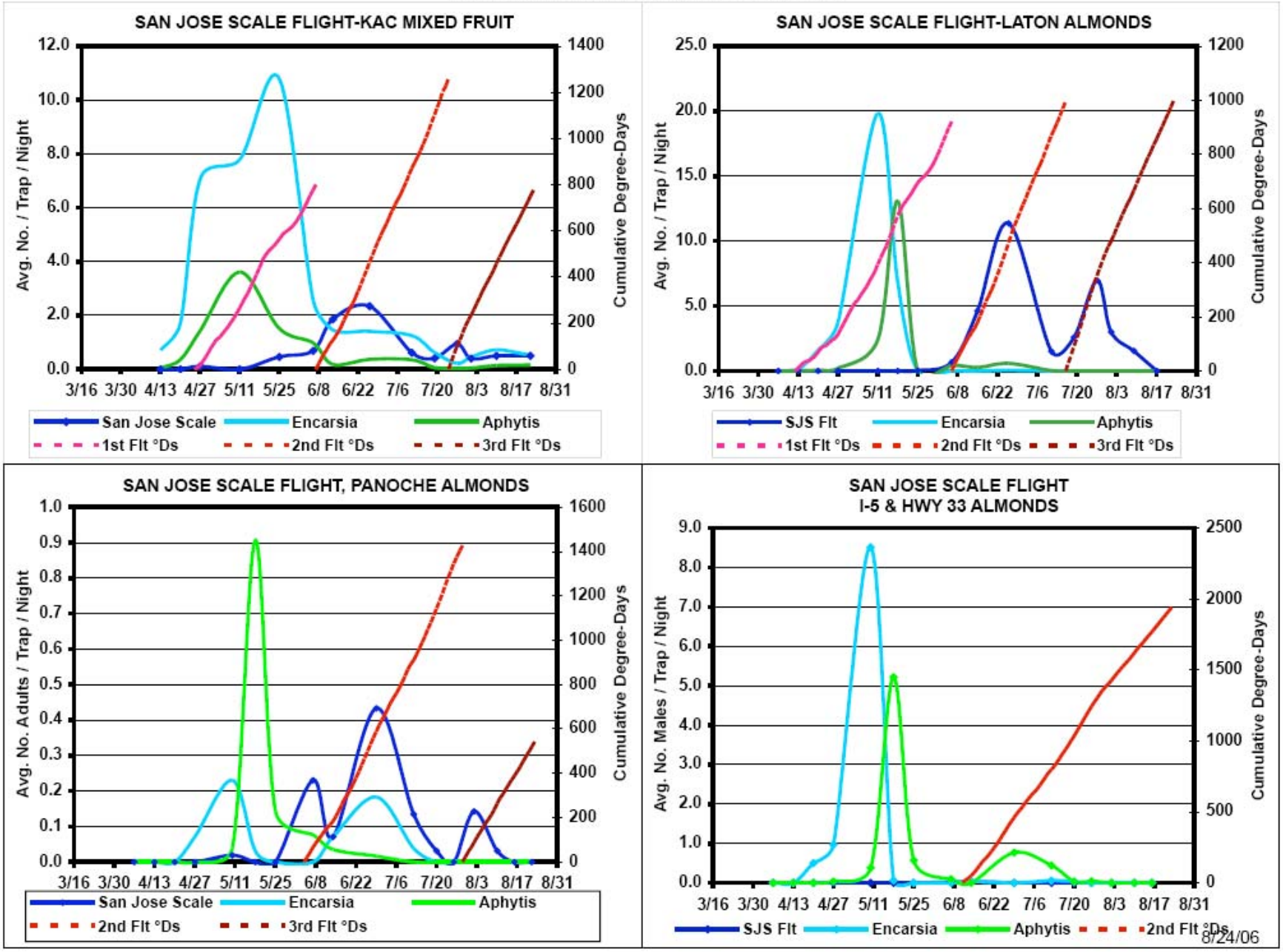


2006 OMNIVOROUS LEAFROLLER FLIGHTS

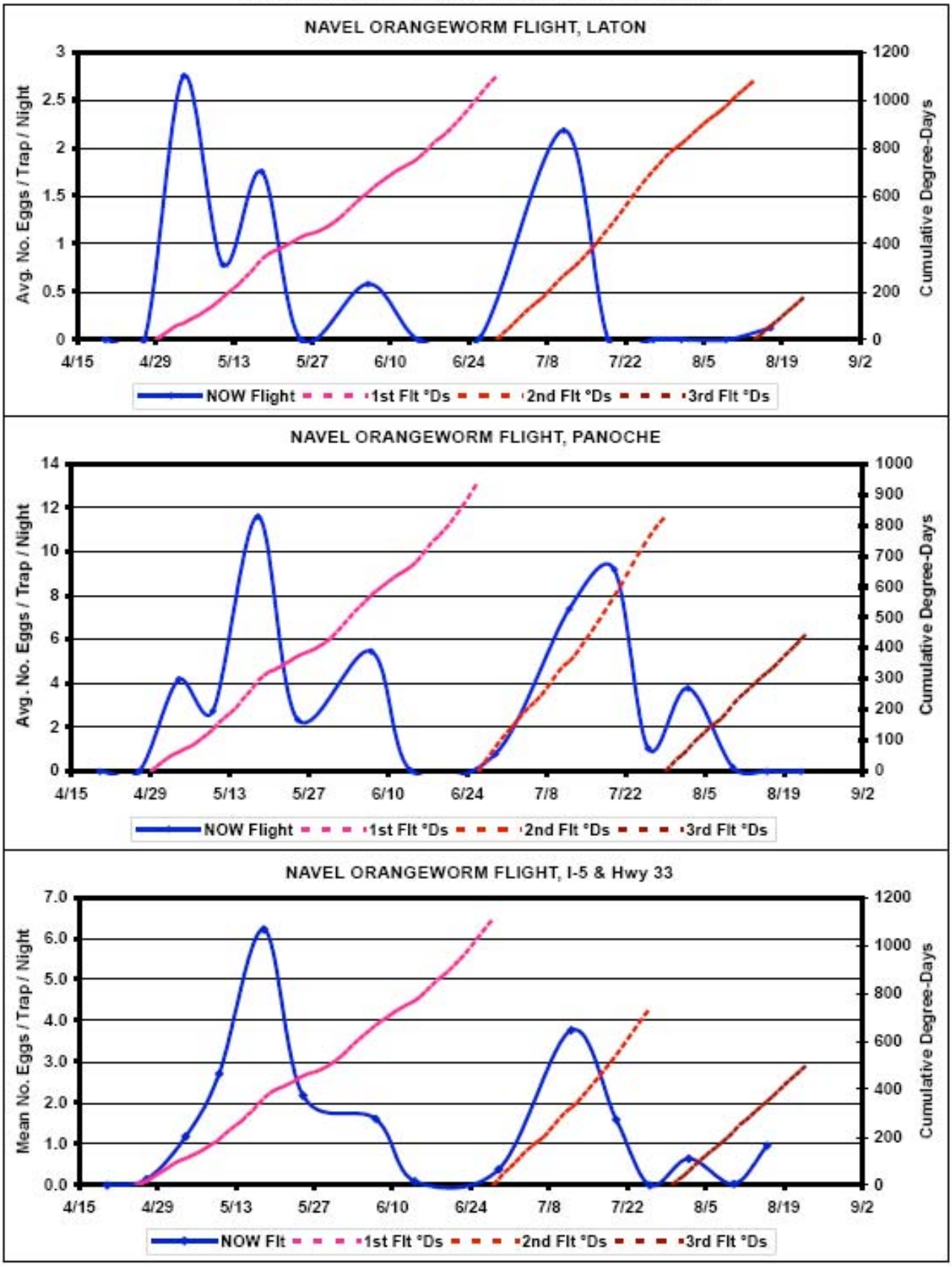



2006 CODLING MOTH FLIGHT
KEARNEY AG CENTER MIXED FRUIT
Avg. No. Moths / Trap / Night
Cumulative Degree-Days
3.5
3
2.5
2
1.5
1
0.5
0
1400
1200
1000
800
600
400
200
0
3/1
3/15
3/29
4/12
4/26
5/10
5/24
6/7
6/21
7/5
7/19
8/2
8/16
8/30
9/13
CM Flight
1st Flt °Ds
2nd Flt °Ds
3rd Flt °Ds
8/24/06

2006 SAN JOSE SCALE FLIGHTS



2006 NAVEL ORANGEWORM FLIGHTS



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