# Heat at bloom in prunes

## What's happened and what can be done?

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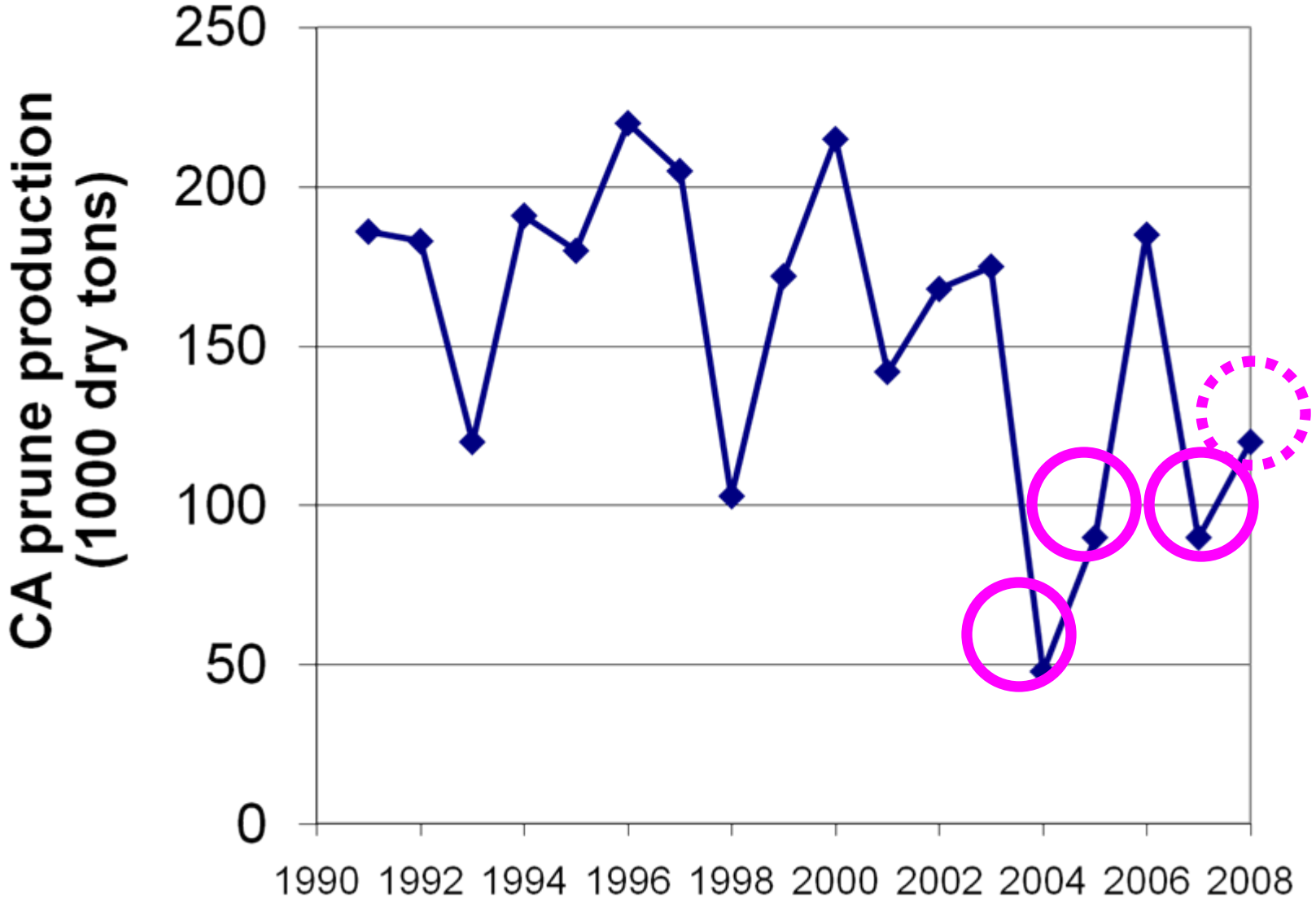
**Tehama Co. Prune Day**
**February 6, 2009**


**University of California**
**Cooperative Extension**

**Agriculture & Natural Resources**
**Central Valley Region**

# California prune growers face a huge, new challenge.



# Sutter County Prune Production

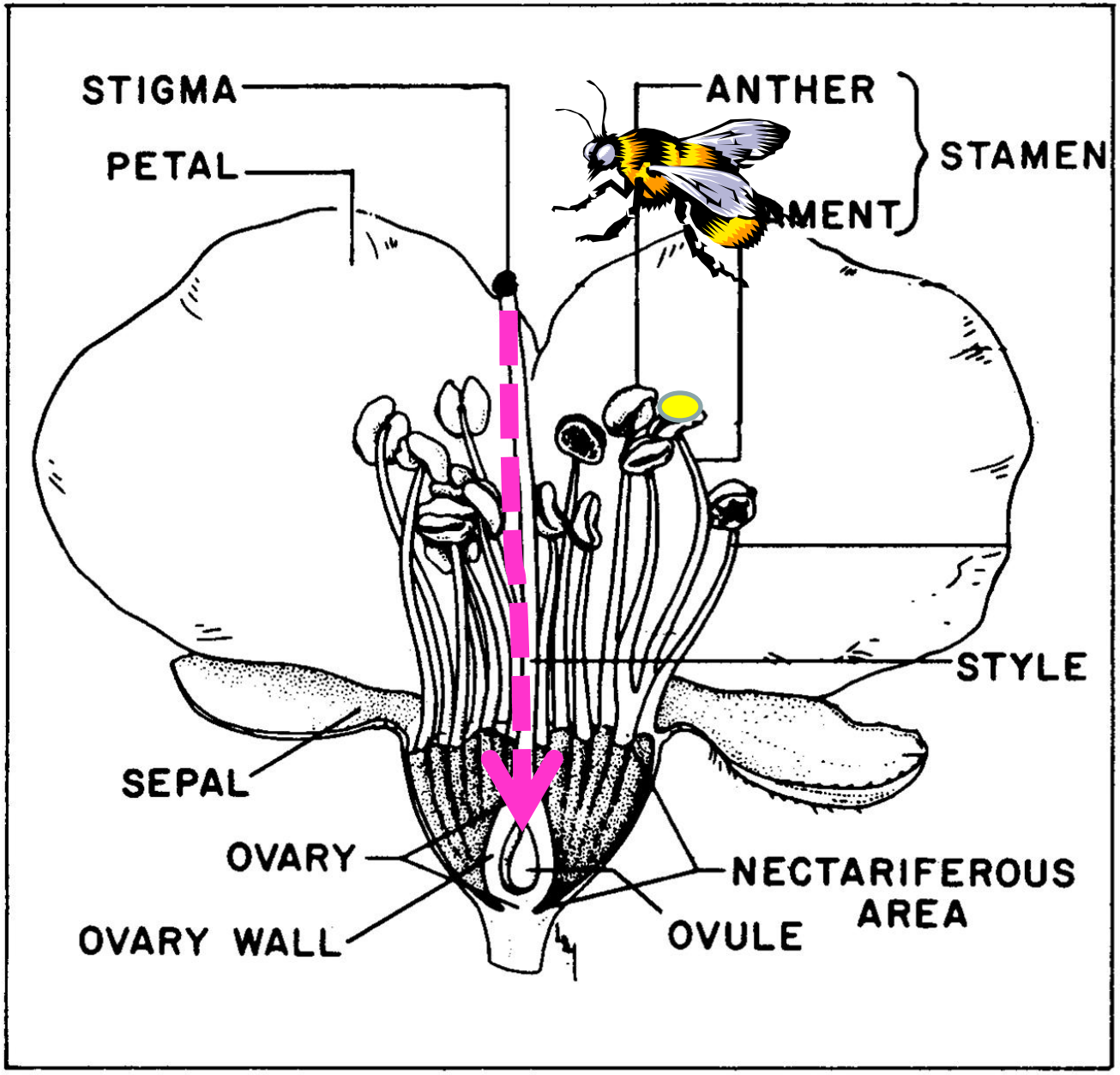
| Year | Ave. crop/acre |
|---|---|
| 2004 | 0.47 |
| 2005 | 0.70 |
| 2006 | 2.61 |
| 2007 | 1.00 |

# Sutter County Prune Production

| Year | Crop/acre | Bloom Temps |
|---|---|---|
| 2004 | 0.47 | 81ºF |
| 2005 | 0.70 | 82ºF |
| 2006 | 2.61 | 62ºF |
| 2007 | 1.00 | 83ºF |

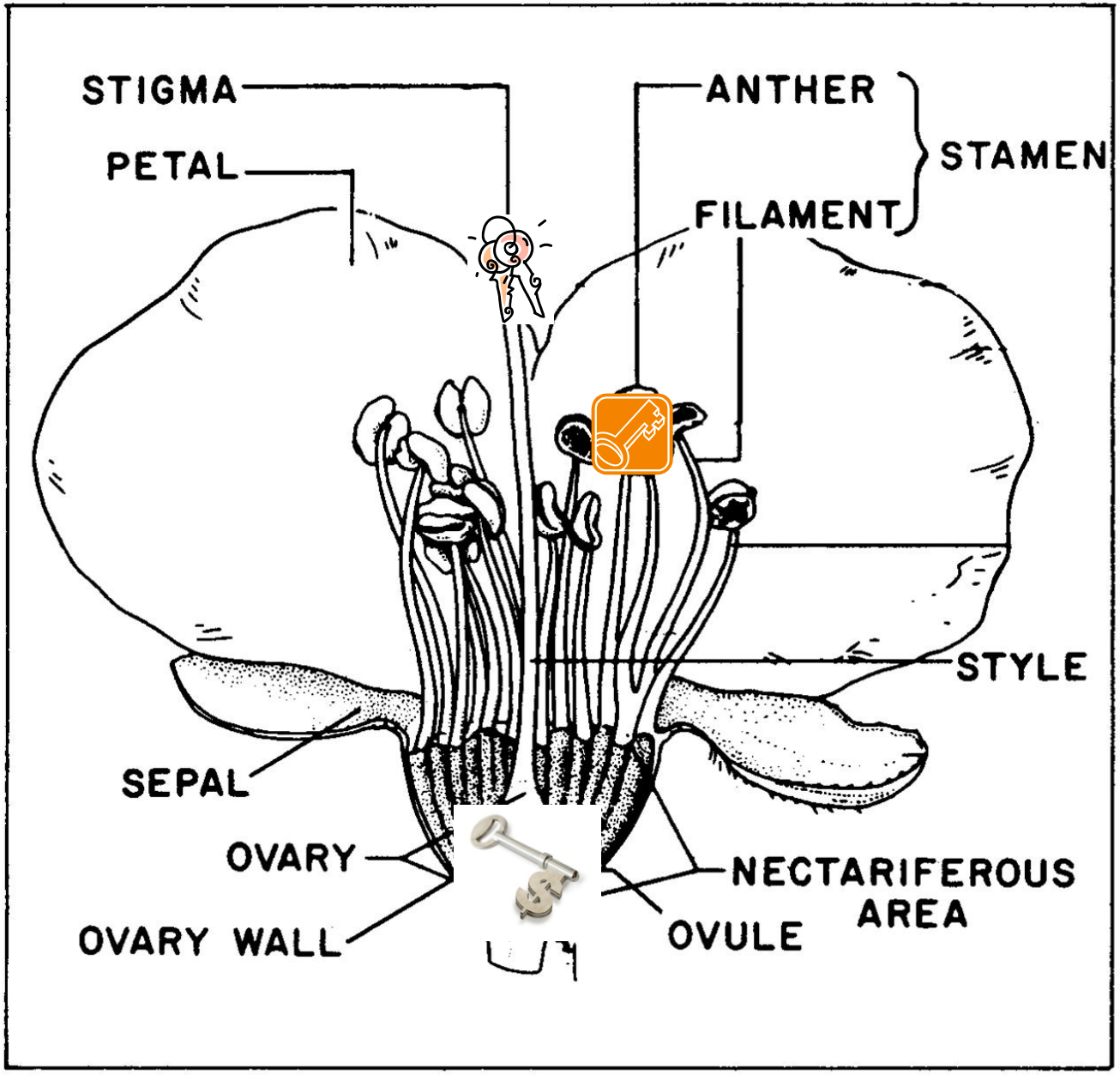
| Day time maximum temps | Chance of a good crop |
| --- | --- |
| Under 75ºF | Good/Decent |
| 75º to 80º | Not as good |
| Over 80ºF | Poor |

Management Options:
- Run water when temperatures are above 70ºF
- Keep good bee activity throughout the orchard


STIGMA
ANTHER
PETAL
STAMEN
STYLE
SEPAL
OVARY
NECTARIFEROUS AREA
OVARY WALL
OVULE

# Bees increase prune fruit set

| **Got Bees?** | **% Fruit Set** |
|---|---|
| **No Bees (trees caged w/o bees)** | **1** |
| **Free range bees (no cages)** | **4-22** |
| **Rented Bees (trees caged with bees)** | **15-19** |


STIGMA
PETAL
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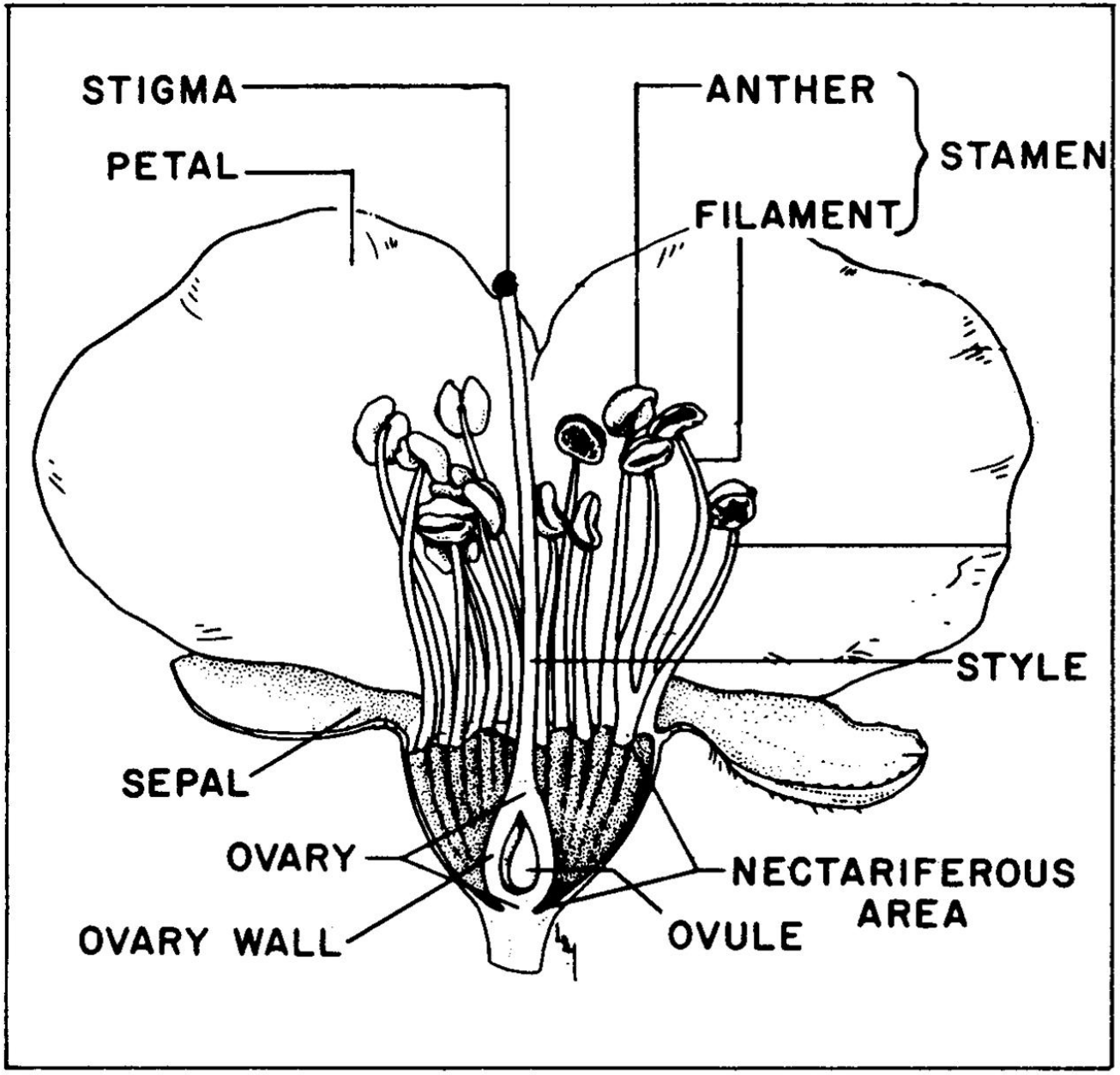
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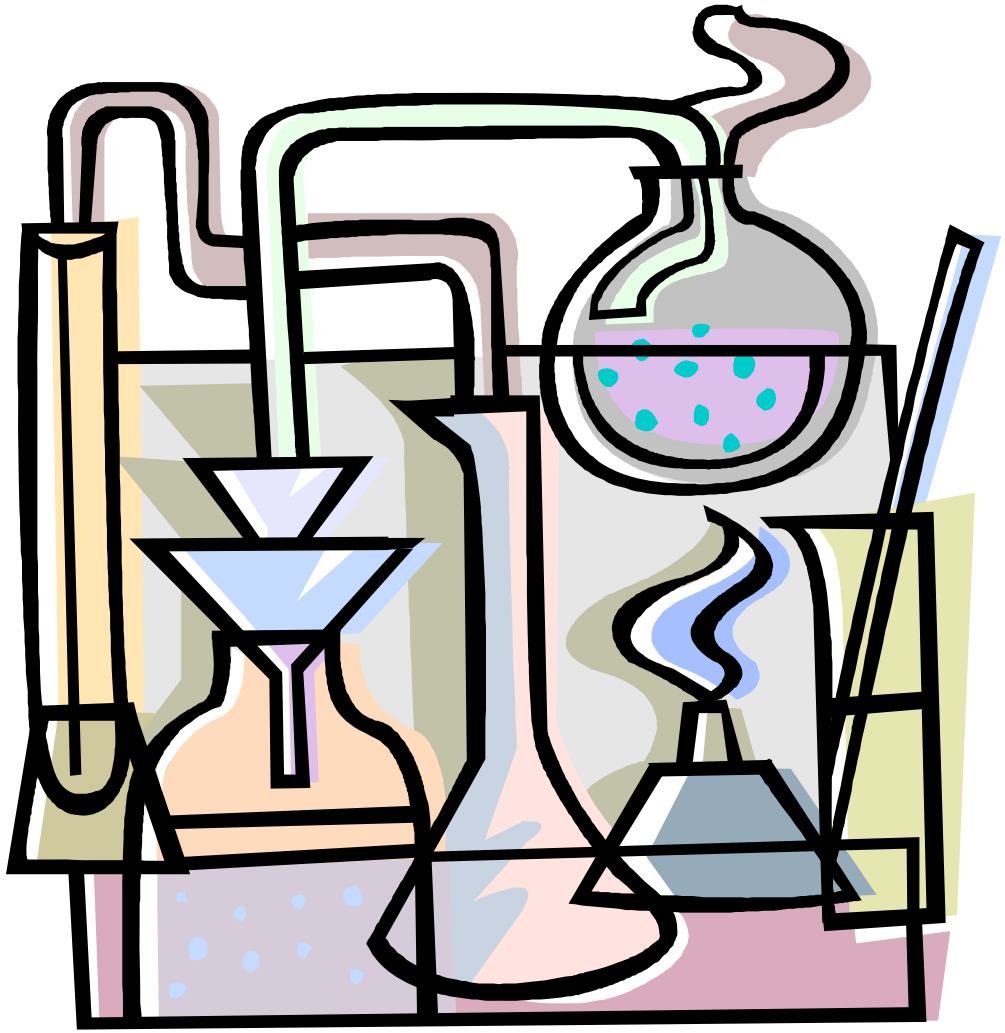
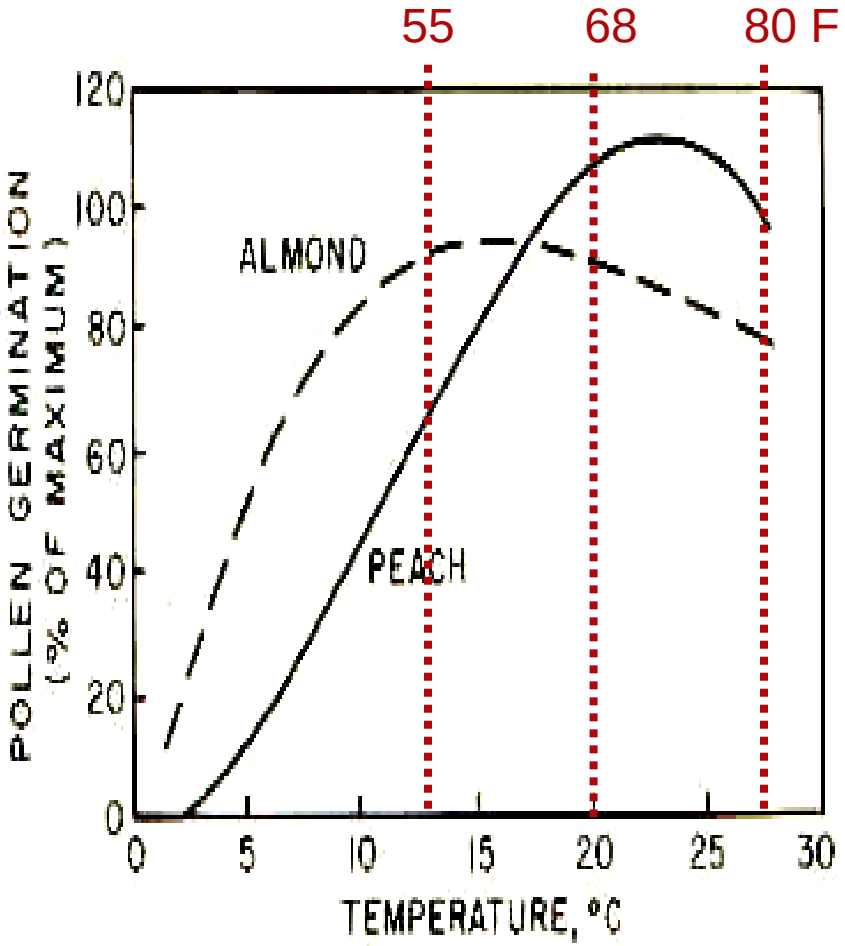
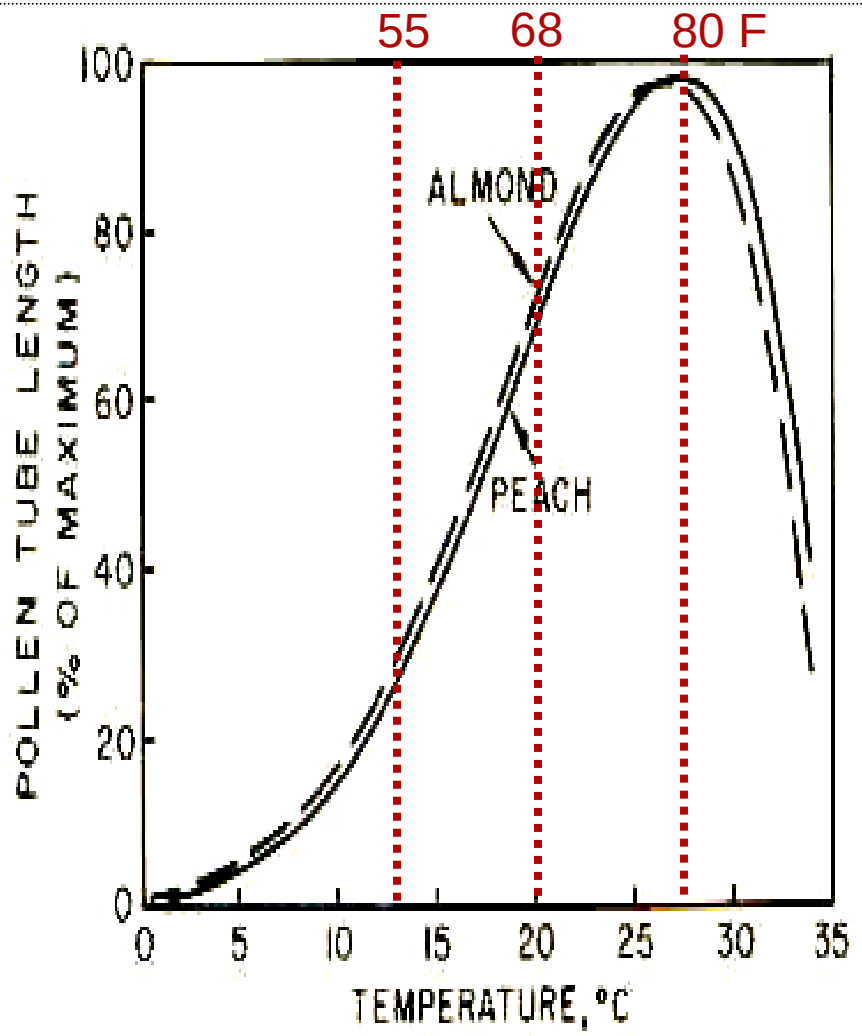


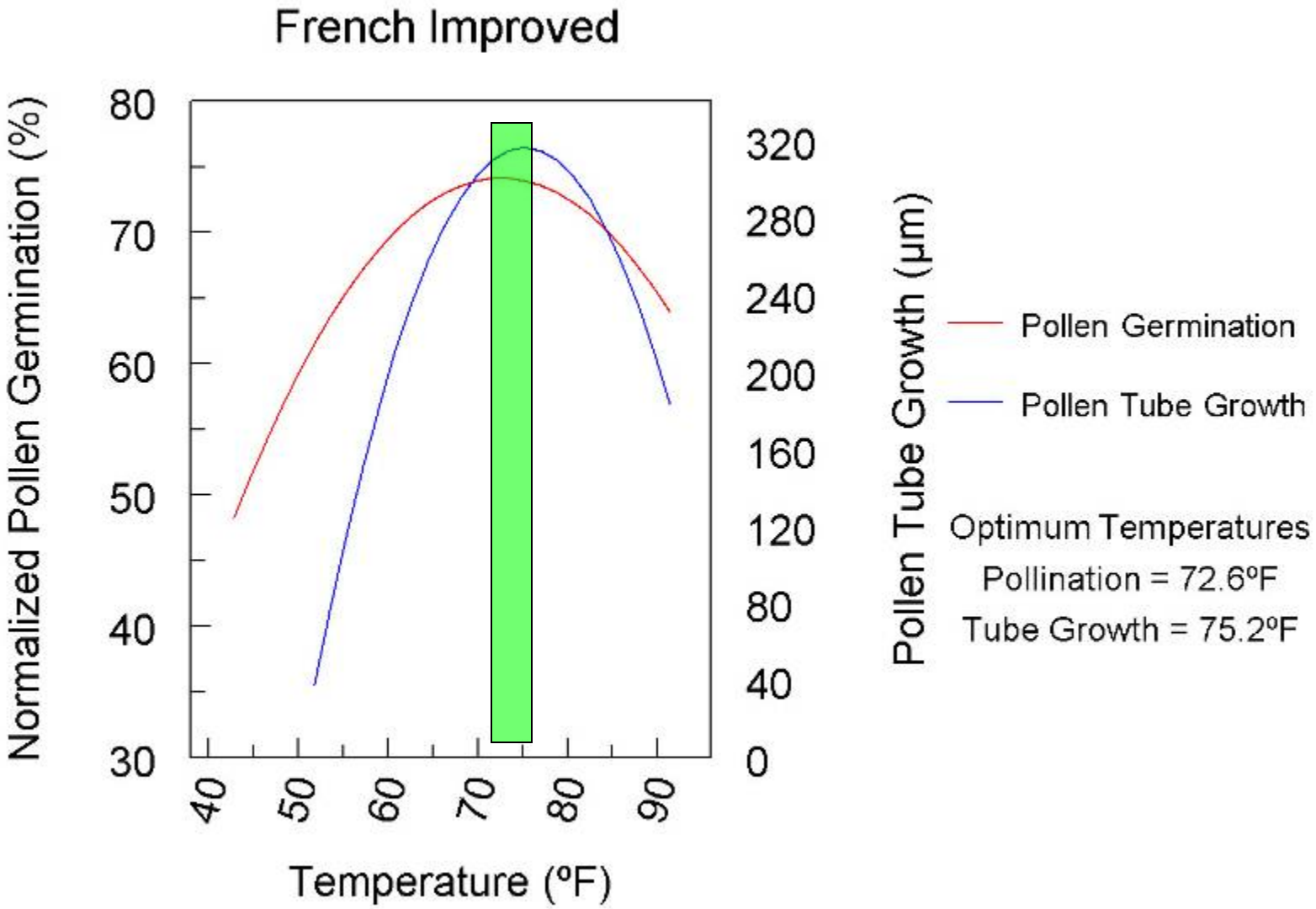
# Temperature

## Pollen germination and pollen tube growth responses to temperature for almond and peach.



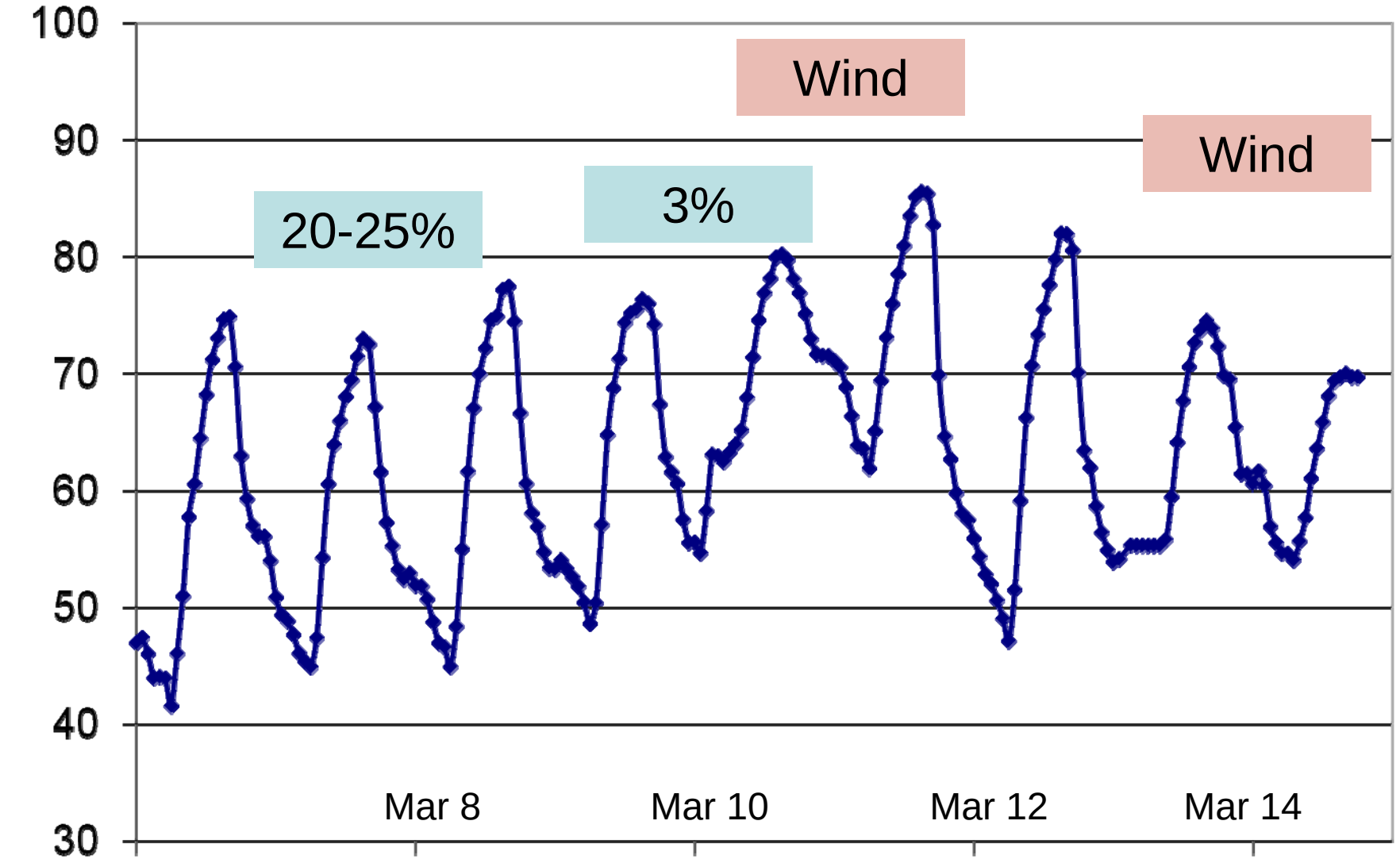
# Pollen tube germination and growth diminish over 75ºF

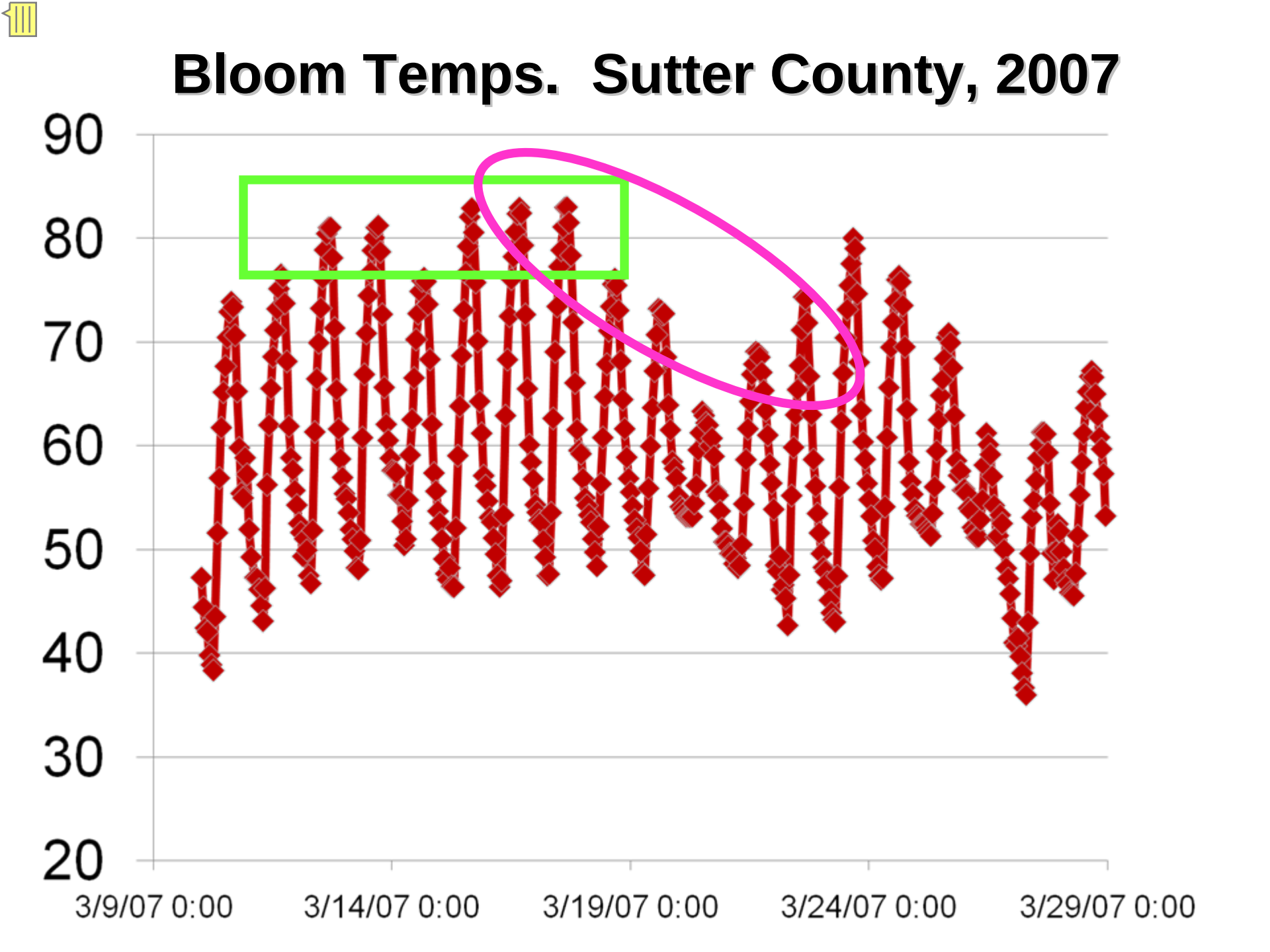



DeCeault and Polito, 2007

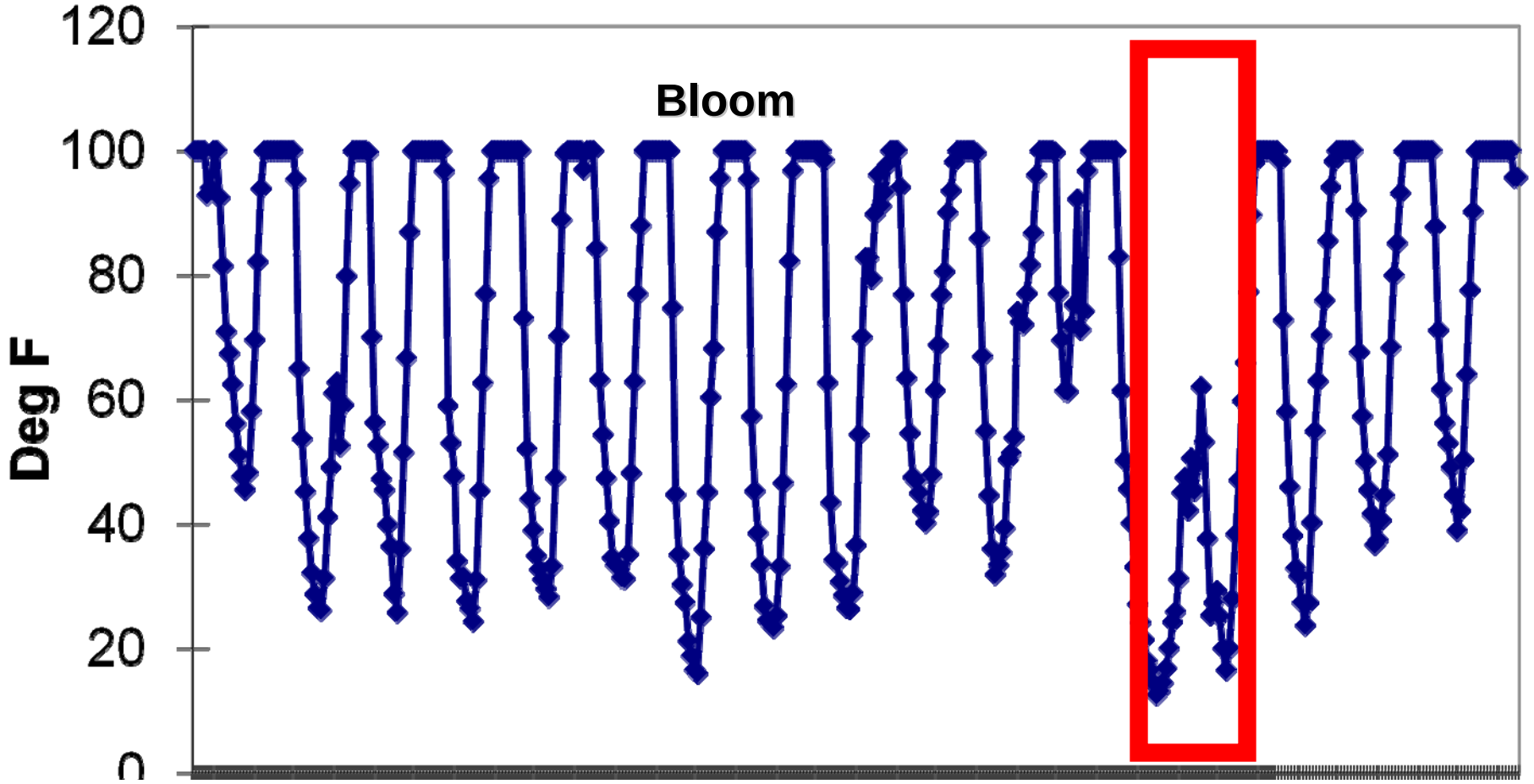
- Lack of bee activity limits pollinization
- High temperatures limit pollen germination and pollen tube growth
- Ovule viability:  Unknown

# Lab data fit well with field data from Sutter County, 2005.



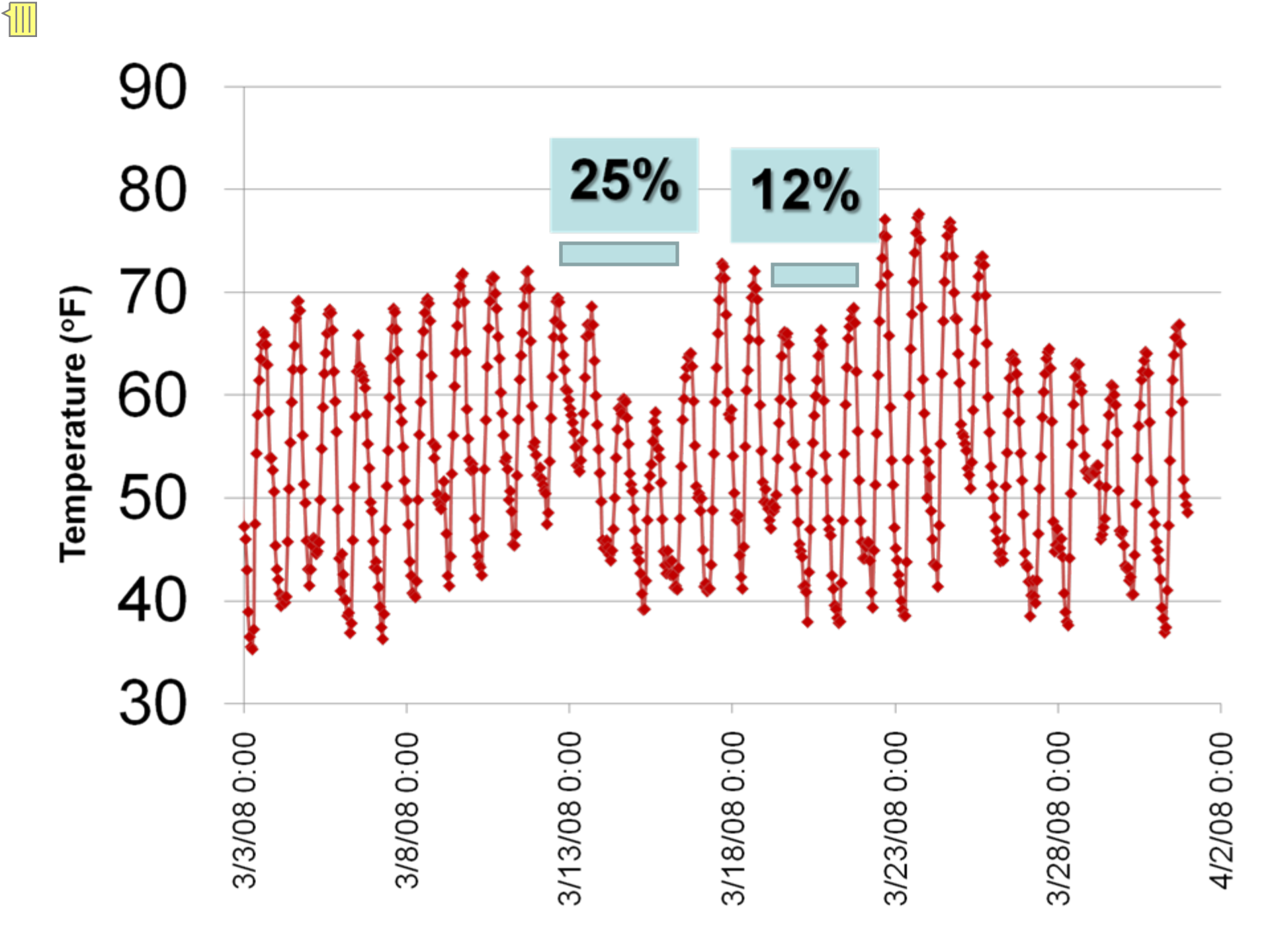

Bloom Temps. Sutter County, 2007
90
80
70
60
50
40
30
20
3/9/07 0:00
3/14/07 0:00
3/19/07 0:00
3/24/07 0:00
3/29/07 0:00

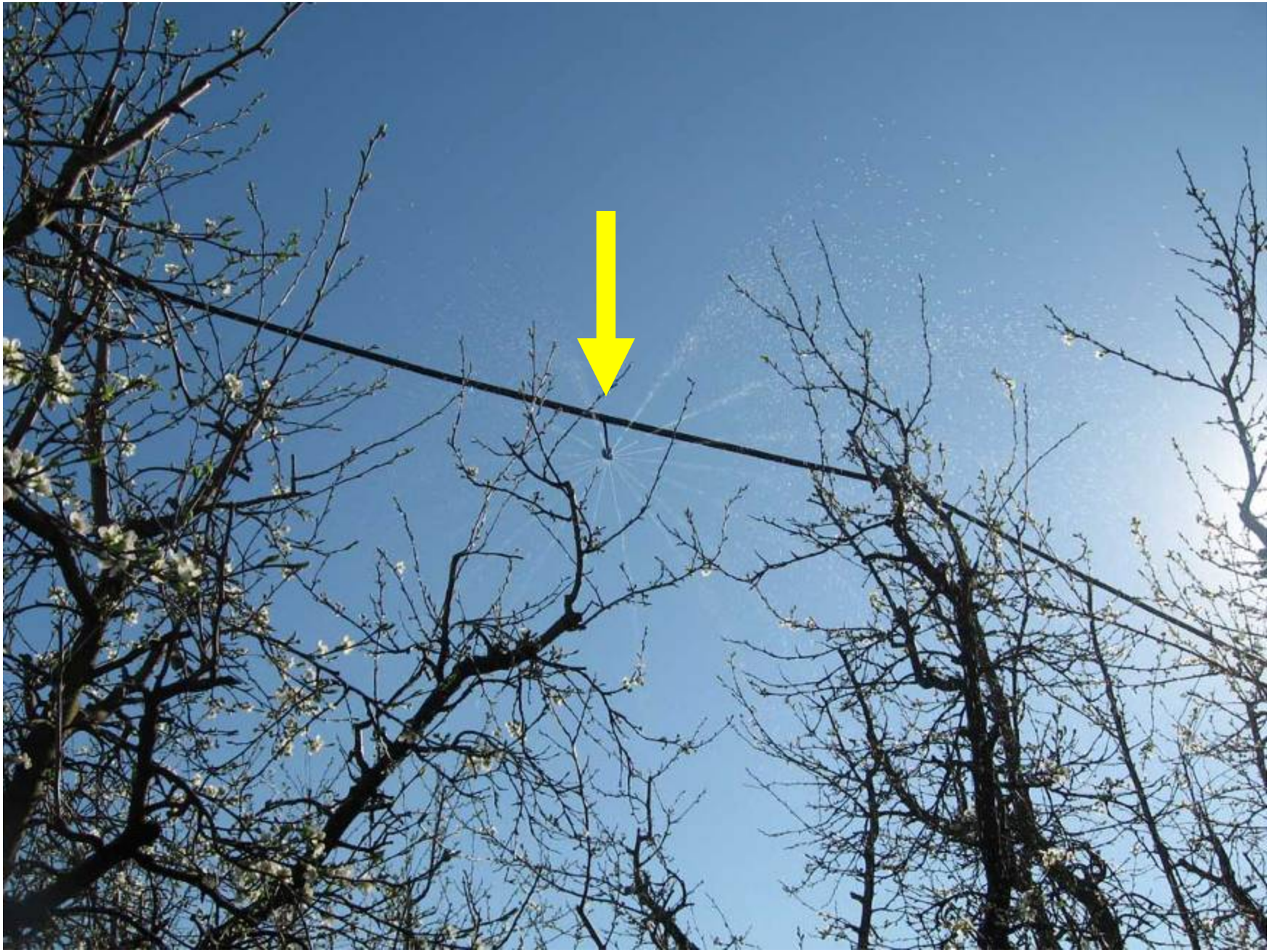
# Sutter County, 2007. %RH



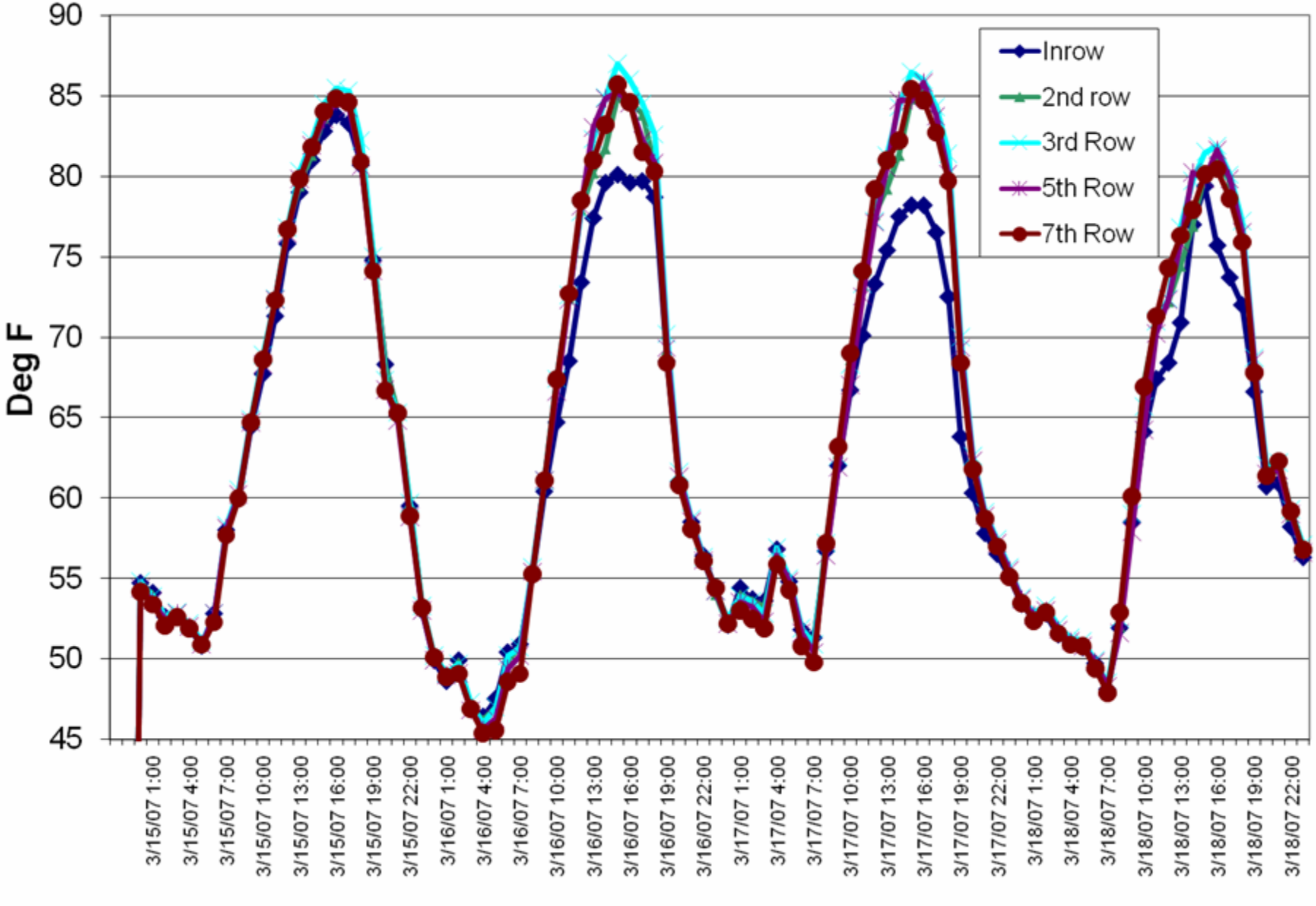
# Field conditions point to heat, not humidity, as key factor in low set.

| Year | Crop | Bloom Temps | Bloom Conditions |
|---|---|---|---|
| 2004 | 0.47 | 81ºF | Hot & windy |
| 2005 | 0.70 | 82ºF | Hot, some wind |
| 2006 | 2.61 | 62ºF | Cool and wet |
| 2007 | 1.00 | 83ºF | Hot, no wind |

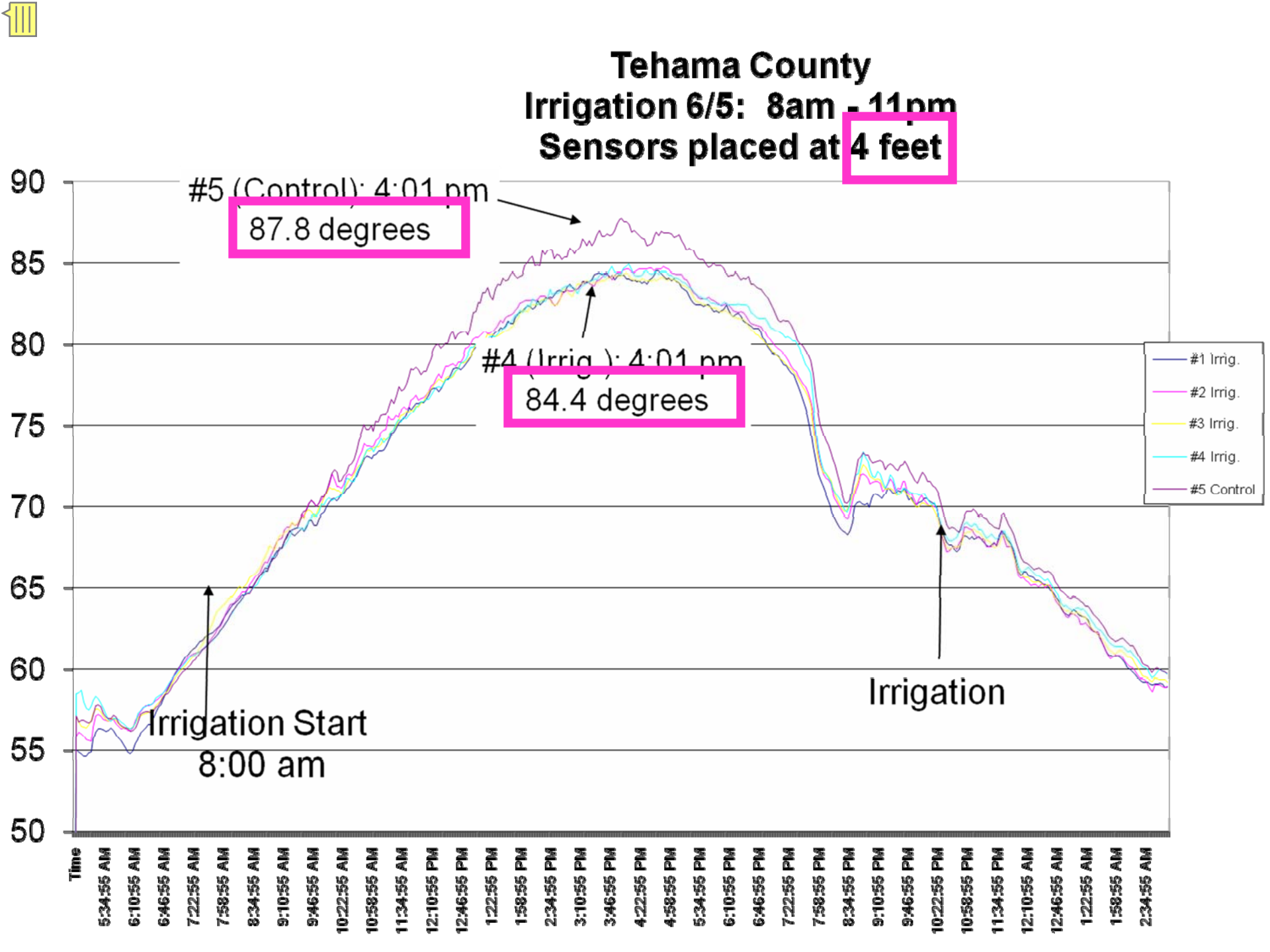

90
80
70
60
50
40
30
Temperature (°F)
25%
12%
3/3/08 0:00
3/8/08 0:00
3/13/08 0:00
3/18/08 0:00
3/23/08 0:00
3/28/08 0:00
4/2/08 0:00



# Air temperature (°F) in canopies cooled and uncooled on March 16 & 17, Nielsen Orchard, Glenn County. 2007.



# Can under tree irrigation water cool an orchard? How much?


Tehama County
Irrigation 6/5: 8am - 11pm
Sensors placed at 4 feet
#5 (Control): 4:01 pm
87.8 degrees
#4 (Irrig.): 4:01 pm
84.4 degrees
Irrigation Start
8:00 am
Irrigation
90
85
80
75
70
65
60
55
50
#1 Irrig.
#2 Irrig.
#3 Irrig.
#4 Irrig.
#5 Control
Time
5:34:55 AM
6:10:55 AM
6:46:55 AM
7:22:55 AM
7:58:55 AM
8:34:55 AM
9:10:55 AM
9:46:55 AM
10:22:55 AM
10:58:55 AM
11:34:55 AM
12:10:55 PM
12:46:55 PM
1:22:55 PM
1:58:55 PM
2:34:55 PM
3:10:55 PM
3:46:55 PM
4:22:55 PM
4:58:55 PM
5:34:55 PM
6:10:55 PM
6:46:55 PM
7:22:55 PM
7:58:55 PM
8:34:55 PM
9:10:55 PM
9:46:55 PM
10:22:55 PM
10:58:55 PM
11:34:55 PM
12:10:55 AM
12:46:55 AM
1:22:55 AM
1:58:55 AM
2:34:55 AM

# Cooling requirements with irrigation water are similar to heating.

- Moist soil, not saturated, ahead of heat
- Keep replacing evaporated water
- Taller weeds in the orchard = cooler temps vs. short weeds.
- Until we know more, run water on days when predicted temps exceed 70°F.
- Don’t expect miracles.

Rent bees

Scatter the hives in the orchard?

| Day time maximum temps | Chance of a good crop |
|---|---|
| Under 75ºF | Good/Decent |
| 75º to 80º | Not as good |
| Over 80ºF | Poor |

Management Options:
- Run water when temperatures are above 70ºF
- Keep good bee activity throughout the orchard

# ***Thank you***