Using Oil and Chill Hours to Manipulate Prune Bloom Date

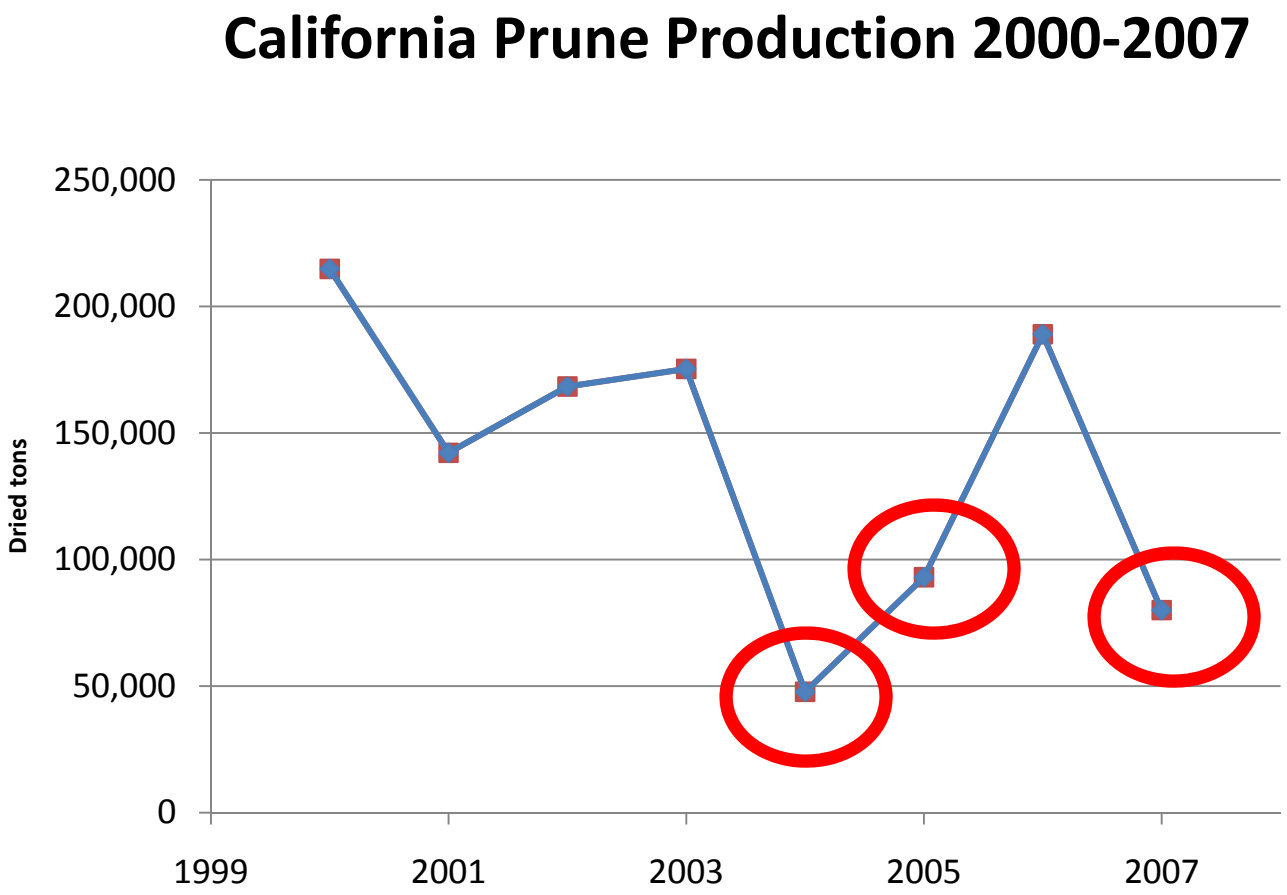
Franz Niederholzer, UC Farm Advisor

Tehama Prune Day
February 5, 2010

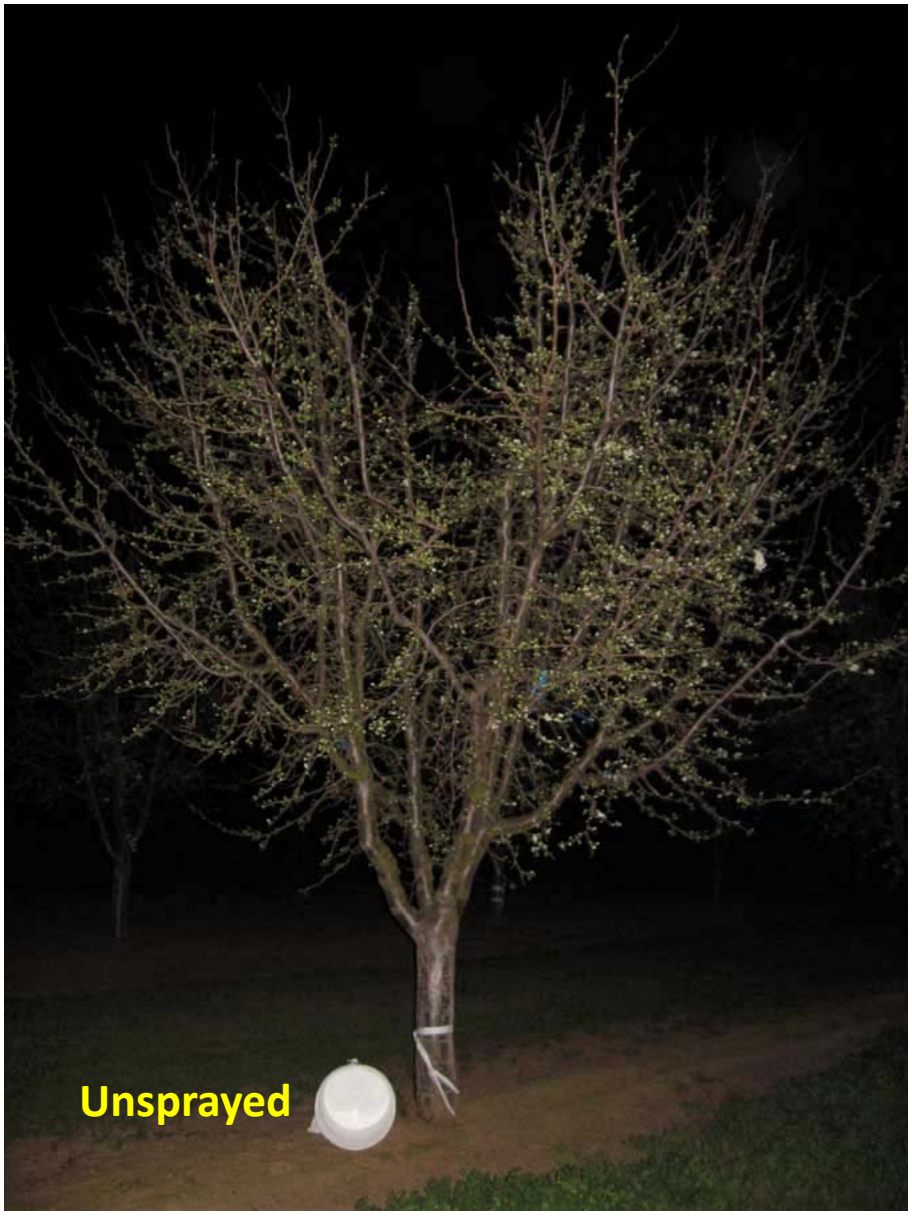
University of California
Cooperative Extension

Agriculture & Natural Resources
Central Valley Region

Bad bloom weather can ruin a prune crop.



High rate of oil in a dormant spray advances bloom.



Traditional timing for oil to advance prune bloom is late Dec to mid January.


CALIFORNIA REPUBLIC

Dormancy Review


UCDAVIS
352
UCDAVIS
323

Chilling
accumulation

Start

Finish

Heat accumulation

Chilling accumulation

Start

Finish

Heat accumulation

Chilling accumulation

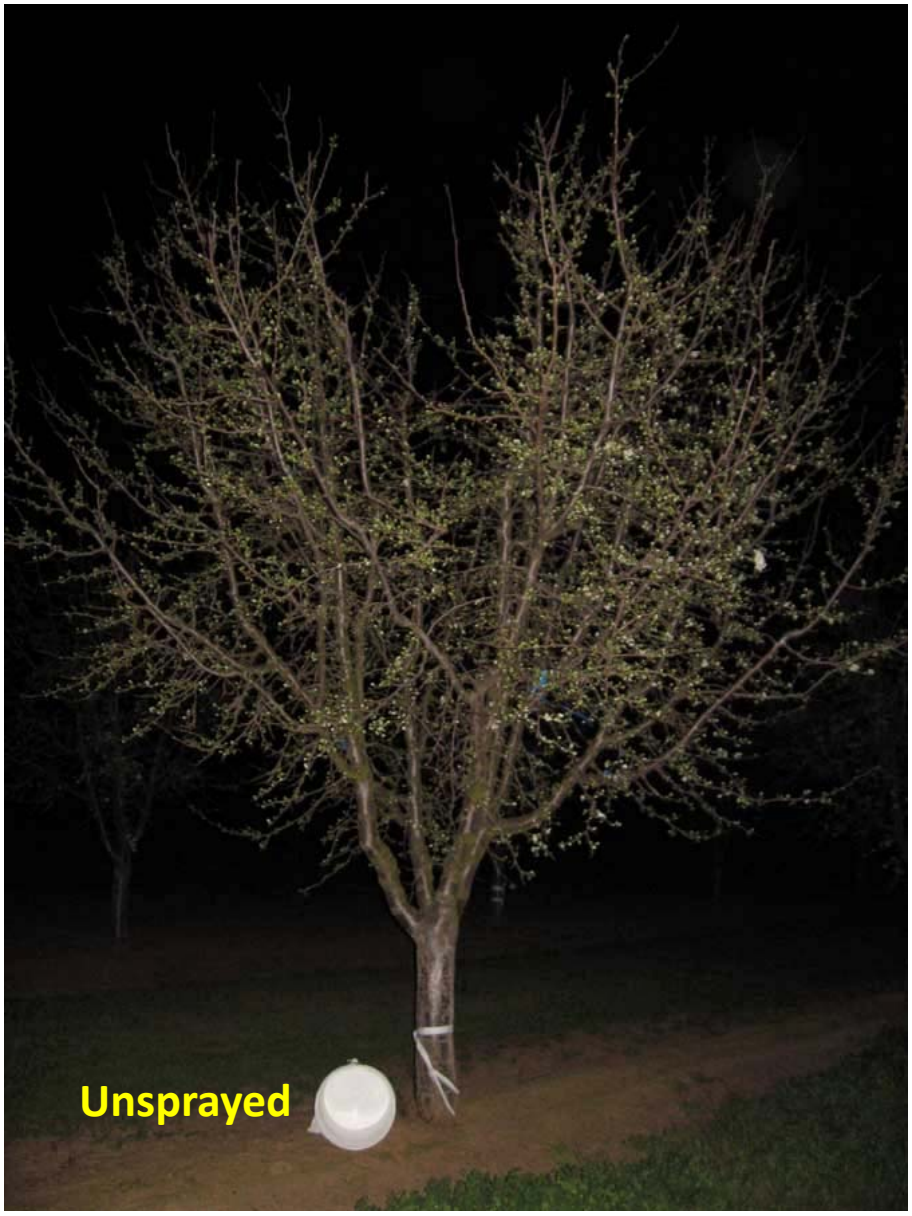
Start

Finish

Finish

Heat accumulation

Photographed on March 13, 2008



How is chilling accumulation measured?

There are different ways to measure chilling accumulation.

- Hours under 45°F
- Utah Model: Sliding scale of chilling units between 32°F-59°F. Temp over 59°F cancels earlier chilling units. Works in cold regions.
- Dynamic Model: Chilling unit total grows using a sliding scale similar to Utah Model. Works well in many climates.

The Dynamic Model best matches field data.

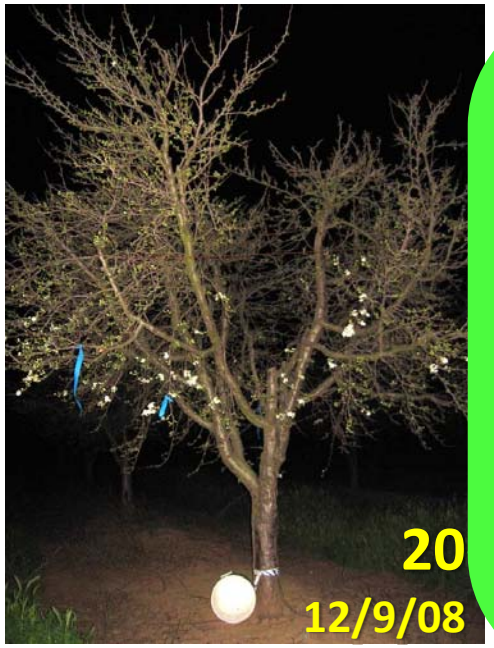
Results of three years of work with oil timed at chilling accumulation, not date.

		2006		2008		2009
Treatment	Spray Date	50% bloom: days from control	Spray Date	50% bloom: days from control	Spray Date	50% bloom: days from control
Oil @ 27-30 CP	16-Dec	-14	22-Dec	-2	23-Dec	-2
oil @ 38-41 CP	6-Jan	-11	2-Jan	-3	6-Jan	-3
oil @ 50-53 CP			18-Jan	-3	26-Jan	-1
oil @ 59-64 CP	6-Feb	0.3	30-Jan	-3	11-Feb	-1

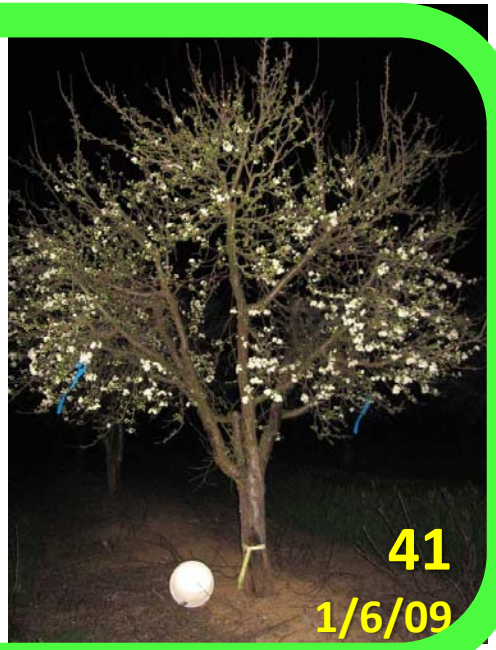
Results of three years of work with oil timed at chilling accumulation, not date.

	2006	2006	2008	2008	2009	2009
Treatment	Spray Date	Days from control	Spray Date	Days from control	Spray Date	Days from control
Oil @ 27-30 CP	16-Dec	-14	22-Dec	-2	23-Dec	-2
oil @ 38-41 CP	6-Jan	-11	2-Jan	-3	6-Jan	-3
oil @ 50-53 CP			18-Jan	-3	26-Jan	-1
oil @ 59-64 CP	6-Feb	0.3	30-Jan	-3	11-Feb	-1

OK, how do I know when to spray?


20
12/9/08


30
12/23/08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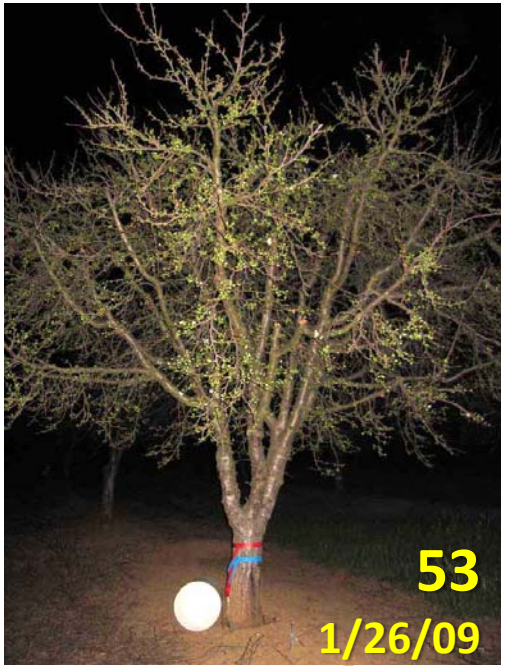
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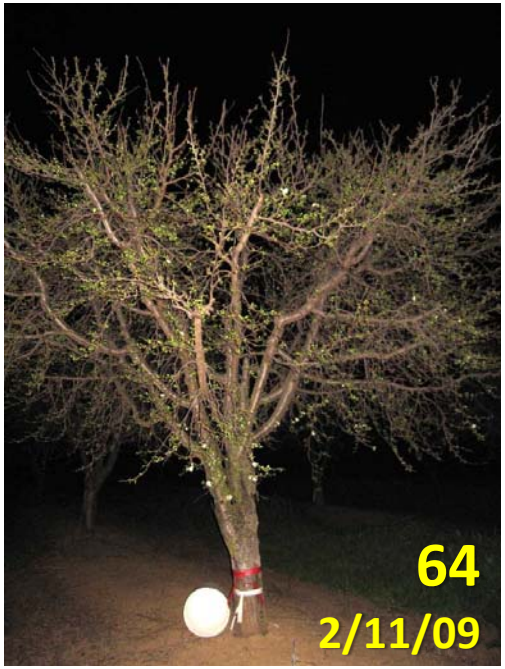
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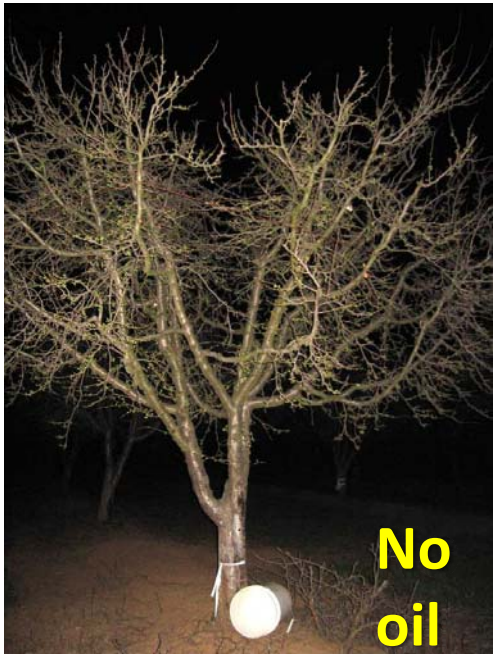
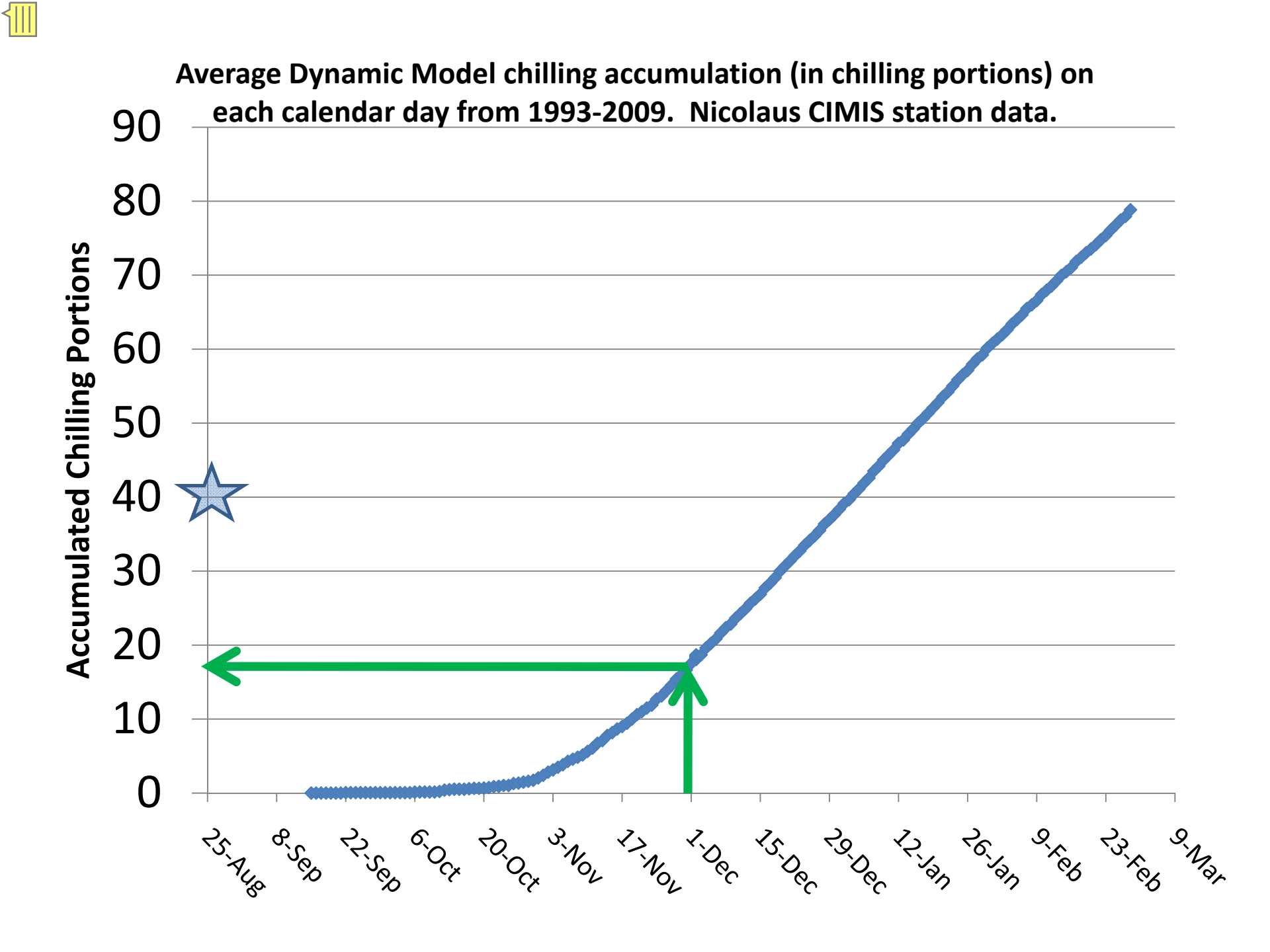
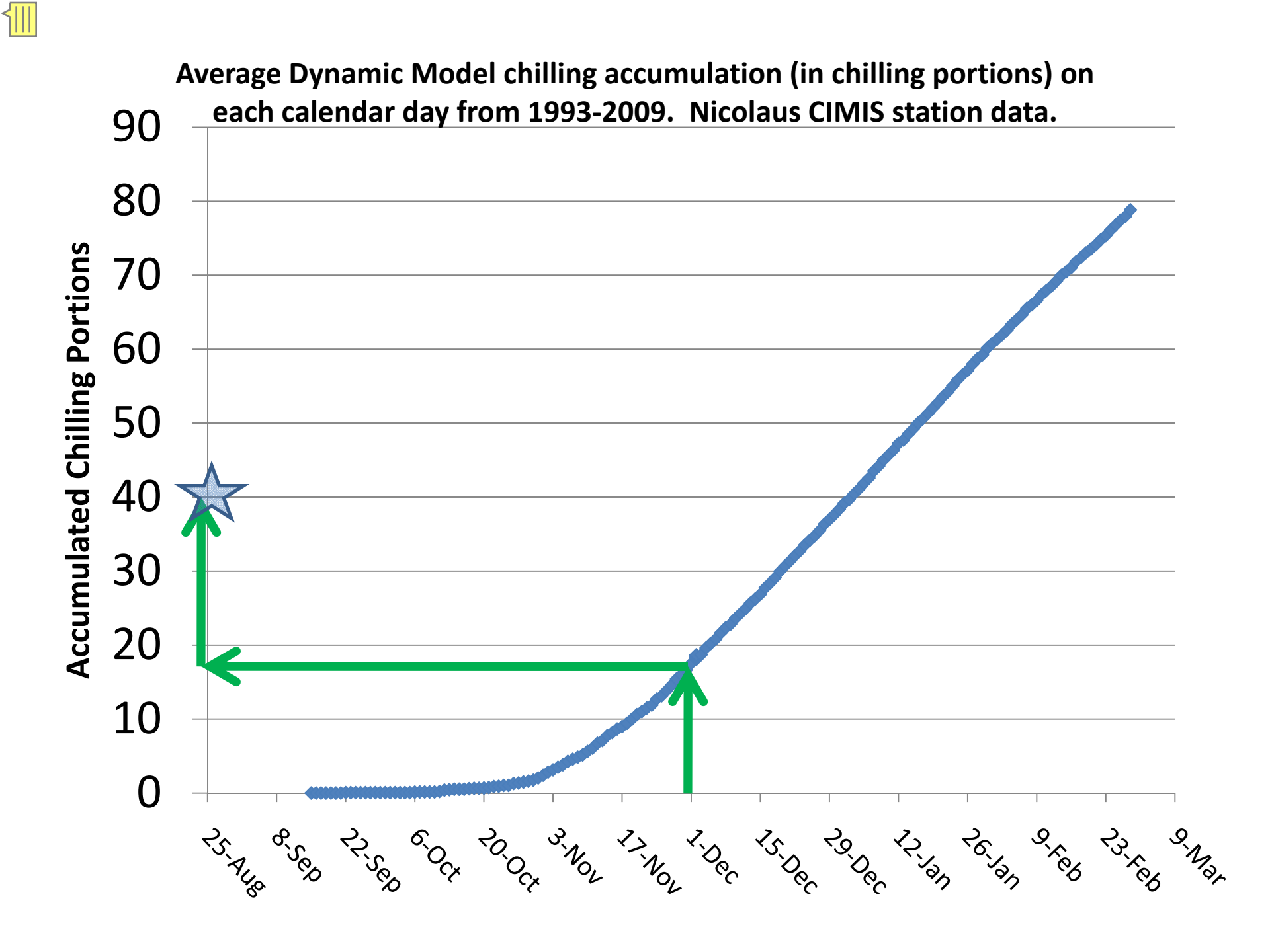
2/11/09


No
oil


Average Dynamic Model chilling accumulation (in chilling portions) on each calendar day from 1993-2009. Nicolaus CIMIS station data.
Accumulated Chilling Portions
90
80
70
60
50
40
30
20
10
0
25-Aug
8-Sep
22-Sep
6-Oct
20-Oct
3-Nov
17-Nov
1-Dec
15-Dec
29-Dec
12-Jan
26-Jan
9-Feb
23-Feb
9-Mar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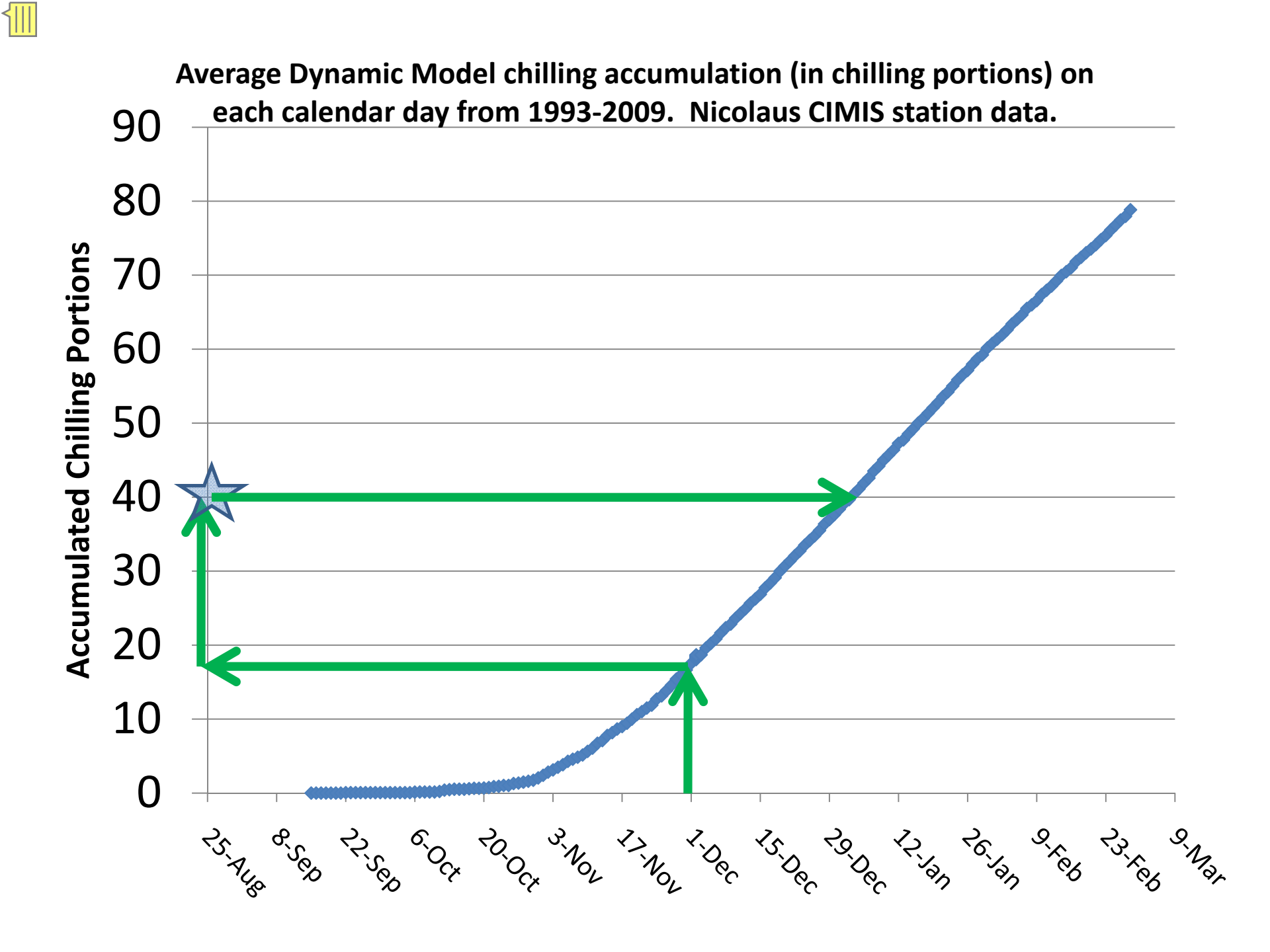
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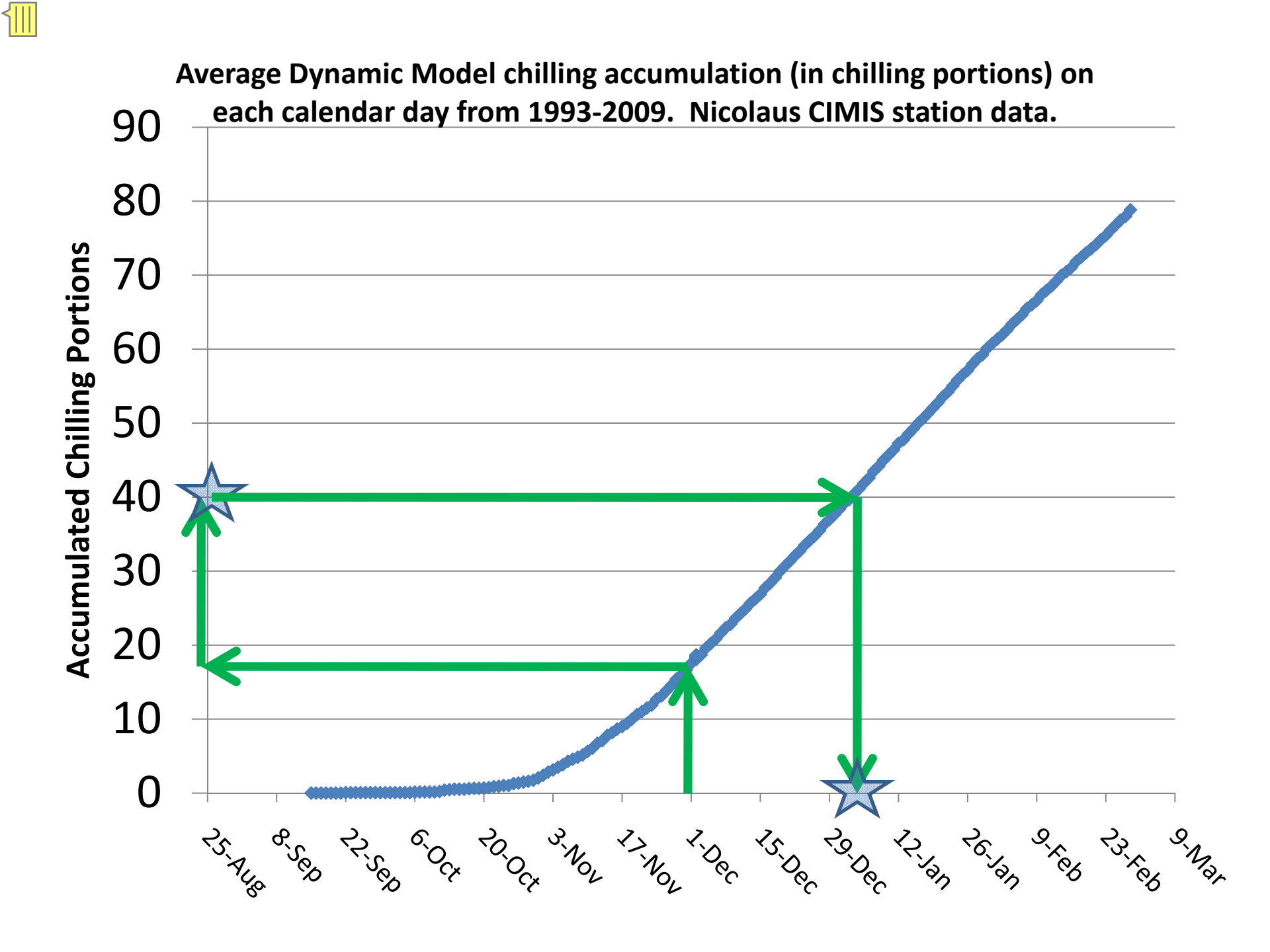
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23-Feb
9-Mar

Date 40 Chill Portions (CP) accumulated at different locations in the Sacramento Valley.

Location	2009-10	2008-09	2007-08	2006-07	2005-06	2004-05
Nicholaus	Dec 24	Jan 2	Jan 2	Jan 4	Jan 13	Dec 18
Durham	Dec 24	Jan 2	Jan 4	Jan 7	Jan 11	Dec 24
Orland	Dec 28	Jan 6	Jan 6	Jan 6	Jan 12	Dec 22
Gerber	Dec 27	Jan 4	Jan 2	Jan 4	Jan 7	Dec 21

Date 40 Chill Portions (CP) accumulated at different locations in the Sacramento Valley.

Location	2009-10	2008-09	2007-08	2006-07	2005-06	2004-05
Nicholaus	**Dec 24**	Jan 2	Jan 2	Jan 4	Jan 13	**Dec 18**
Durham	**Dec 24**	Jan 2	Jan 4	Jan 7	Jan 11	**Dec 24**
Orland	Dec 28	Jan 6	Jan 6	Jan 6	Jan 12	**Dec 22**
Gerber	Dec 27	Jan 4	Jan 2	Jan 4	Jan 7	**Dec 21**

How do I track chilling accumulation?

http://fruitsandnuts.ucdavis.edu/Weather%5FServices/

Fruit & Nut Research and Information Center - Home Page - Windows Internet Explorer

http://fruitsandnuts.ucdavis.edu/

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Enter Search Term Here

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fruit & nut

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Welcome!

Welcome to the Fruit & Nut Research and Information Center!

We set up this site so you can easily find what you want in as few steps as possible.

- Our individual crop lists of **Fruits and Nuts** have the latest production information for you.
- Our **General Management** pages provide information about the care and protection of your fruit and nut trees.
- Our extensive **Weather-Related Models** pages can help you predict your harvest and estimate chilling hours.
- Links to other resources, including **The Backyard Orchard** and **UC Cooperative Extension Farm Advisors: Newsletters & Information** may help you with specific information for your growing area.
- Our catalog of **Current UC Research Projects** gives you details about current, ongoing research projects in specific crops and production methods.
- Our **Calendar** lists upcoming events, meetings, and workshops you might want to attend to improve your production of fruits and nuts.

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Weather-Related Models

This program provides a simple and efficient way to receive timely weather-related tree crop information specifically for California fruit and nut growers, researchers, and industry. Air temperatures, collected from the California Irrigation Management Information System (CIMIS) weather stations, are used for model calculations.

Chilling Accumulation Models
Using Cumulative Chilling Hours and
odel)

Harvest Prediction Model
for Peaches, Plums and Nectarines

Prune Chilling Prediction Model
(in beta test stage: Fall 2009)

The following stations were added in 2010 and calculations using those stations do not reflect the entire seasonal accumulation: Gilroy211, Denair206 and Hastings Tract East A. For the Gilroy stations, chill portion accumulation up to January 31st was 61 Chill Portions.

Related Information
About CIMIS Weather Stations, About Backup Stations & Error Messages
About Weather-Related Models, Weather Links

Dynamic Model & Chill Accummulation Guide: A how-to guide (pdf) by Kitren Glozer, Dept. of Plant Sciences, for calculating chill portions, using weather data from a data logger in your orchard, and the

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Prune Chilling Prediction: About Chilling & Dormancy

About Chilling & Dormancy | Using the Chilling Predictor | Chilling Predictor Model

Deciduous fruit trees have a mechanism to avoid damage from cold or freezing weather. We generally refer to this as winter dormancy* – the annual life stage of the tree between leaf drop and bud break. Winter dormancy has two stages that can't be visually separated in the field.

In the first part of winter dormancy, technically called endodormancy, tree growth is limited by some unknown factor inside the plant itself – actually in each plant bud. A certain amount of cool temperature is required to end this first stage of winter dormancy. This is referred to as the Chilling Requirement. Temperatures between roughly 30°F – 60°F contribute towards ending this first stage of winter dormancy, with temperatures between 35°F – 50°F contributing the most chilling.

In the second part of winter dormancy, technically called ecodormancy, growth is controlled by an external factor – temperature. Each species of deciduous plant requires a certain amount of heat to begin growing after the first stage of winter dormancy has been completed. So, deciduous fruit trees first need some cool weather and then some warm temperatures to start growing. Different tree species need different amounts of chilling and/or warm temps to begin bloom.

In cool winter climates like the Sacramento Valley of California, sufficient chilling to end the first stage of winter dormancy accumulates for many deciduous tree crop species before cool weather ends. The lack of warm weather is what suppresses bud break.

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Prune Chilling Prediction: Using the Chilling Predictor

About Chilling & Dormancy | **Using the Chilling Predictor** | Chilling Prediction Model

- Using the Chilling Predictor in Prunes
- Why use the Chilling Predictor only after December 1?
- Contact Franz Niederholzer, UC Farm Advisor, Sutter/Yuba Counties, for more information

Bloom at the wrong time, due to extreme weather at bloom or miss-matched pollinizer flowering, can significantly reduce the harvested crop and grower income. Advancing bloom is a tool that may help fruit and nut growers in California spread risk from hot or freezing temperatures at bloom or poorly timed pollizer flowering.

Using the Chilling Predictor in Prunes

Hot or freezing temperatures at bloom can damage a prune crop, significantly reducing grower income. Advancing prune bloom is a tool that can help prune growers in California spread risk from hot or freezing temperatures at bloom.

A heavy oil application (4 – 5 gallons of narrow range horticultural oil/acre) at the right timing will advance prune bloom by several days in most years. The traditional dormant spray timing to advance bloom is late December to mid-January. Oil can be applied alone, or combined with a pesticide for peach twig borer and aphid control. Recent research shows that timing a dormant oil spray after a

Pomology Weather Services - Chilling Predictor - Microsoft Internet Explorer

File Edit View Favorites T

Address http://fruitsandnuts.ucdavis.edu/chillcalc/prunecalc.cfm

Text-only Site Map

Chilling Predictor

Select Station and enter Target Chill Portions

CIMIS Station	Select a Station
Target Chill Portions	40

1

2

3

Get Estimated Spray Date

Comments / Complaints

- Cumulative Chilling Hours
  Hours below 45°F
  Hours between 32°F and 45°F
  November 1 thru February 28/29
- Cumulative Chilling Portions
  Portions (Dynamic Model)
  September 1 through August 31
- Cumulative Chilling - **Research**
  Hours below 45°F
  Hours between 32°F and 45°F
  Units (Utah Model)
  September 1 through August 31
- Harvest Prediction Module
  for Peaches, Plums, and Nectarines
  February 1 through May 31
- Fruit & Nut Research and Information Center
- Weather-Related Models
- Harvest Prediction: About Growing Degree Hours

Pomology Weather Services - Chilling Predictor - Microsoft Internet Explorer

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Address http://fruitsandnuts.ucdavis.edu/chillcalc/prunecalc.cfm

Text-only Site Map

Chilling Predictor

Select Station and enter Target Chill Portions

CIMIS Station Select a Station

Target Chill Portions

Select a Station
Colusa
Durham
Nicolaus

1

Spray Date

Comments / Complaints

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Text-only Site Map

Chilling Predictor

Select Station and enter Target Chill Portions

CIMIS Station	Durham
Target Chill Portions	75

2

Get Estimated Spray Date

3

Comments / Complaints

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Text-only Site Map

Chilling Predictor

Select Station and enter Target Chill Portions

CIMIS Station	Durham
Target Chill Portions	75

Get Estimated Spray Date

Comments / Complaints

Estimated Earliest Spray Date:	2/7/2010
Estimated Spray Date[1]:	2/7/2010
Days to Earliest Spray Date:	3
Days to Spray Date[1]:	4
Remaining Chill Portions[2]:	3
Chill Portions to Date:	72

1. Based on 15 year Average.
2. Target Chill Portions minus Current Chill Portions.

Don’t lose sight of key points.