The Influence of Chilling and Heat Accumulation on Nonpareil and Mission Bloom Timing and Length and Crop Yield

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PROJECT SUMMARY

Objectives:

1. Evaluate correlations between temperature patterns prior to bloom and bloom timing.
2. Evaluate correlations between temperature patterns during bloom and bloom length.
3. Evaluate correlations between temperature patterns during bloom, bloom length and corresponding yields.

Background and Discussion:

Melanie Covert was an Almond Board sponsored UC Pomology Farm Advisor intern during the 2010 season. This is a summary of her master's thesis supported by the Almond Board.

This study sought to understand the temperature factors influencing bloom timing and length, and resulting yield. Data for this study was taken from the 1996-2006 Regional Almond Variety Trials (RAVT) located in Butte, San Joaquin and Kern Counties. Analysis was done on the Nonpareil and Mission varieties and included dates of 10% and 90% bloom and yield (lbs/tree). These data were compared with temperature data taken from the California Irrigation Management Information System (CIMIS) website. Temperatures were calculated into Chilling Hours (CH), Utah Chilling Units (CU), Chilling Portions (CP) and Growing Degree Hours (GDH°).

Objective 1: Temperature Patterns Prior to Bloom and Bloom Timing. Five models were used to predict the date of 90% bloom from 1996-2006 in Nonpareil and Mission at each RAVT location. Key findings for bloom timing were the Calendar Model yielded the smallest average errors in predicting 90% bloom dates in Nonpareil and Mission. Of the temperature models, the CP model performed best for predicting 90% Nonpareil bloom while the CU model performed best for predicting 90% Mission bloom.

Objective 2: Bloom Length and GDH° during Bloom. The total accumulated GDH° during bloom (from 10% bloom date to 90% bloom date) for each year and site was calculated. GDH° during bloom was correlated with the length of bloom (number of days between 10% bloom date and 90% bloom date for each year and site).

Objective 3: Yield, Bloom Length and GDH° During Bloom. Total GDH° during bloom was correlated with yield (averaged pounds per tree) for each year and site. Length of bloom in days and yield were correlated. GDH° during the first four days of bloom and yield (averaged pounds per tree) correlated as well.

Conclusion. The results of this study are not sufficiently predictive and future studies on the accuracy of chilling models are needed. The larger errors found with the ability of the CH, CU and CP models to predict the actual date of 90% bloom may be attributed to the fact that growth and rest stages in almonds involve a variety of factors and not yet fully understood. Additional research under controlled conditions is needed to further correlate temperature patterns during bloom and effective nut set.

Crop yields are another complicated matter involving growing conditions during the entire current season, the previous growing season and sometimes reaching as far back as the beginning of a tree's life. Although temperatures during bloom and bloom length may indicate a good start to the season, they are just a portion of the complete process from bud break to harvest.

Project Cooperators and Personnel: Lauren Garner, Jeffrey Wong, and Steven Rein, Cal Poly; Joseph Connell, Farm Advisor, UCCE – Butte County

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