Developing a Carbon Budget, Physiology, Growth, and Yield Potential Model for Almond Trees

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PROJECT SUMMARY

Objectives:

- Develop general estimates of standing orchard biomass of California almond orchards and methods to estimate the standing biomass/carbon content of specific orchards.
- Develop a comprehensive functional/structural computer-based simulation model of tree architectural development and growth in almond, and carbon-partitioning/source-sink interactions within the tree.

Background and Discussion:

This multiyear project is designed to advance the almond industry's understanding of the factors that govern the complex interactions of almond trees and their environment during the growing season and beyond.

The project's objectives are focused on the dynamic processes associated with carbon budgeting, tree growth, and yield, and the interactions among them, with the goal of developing both a complete and integrated understanding of them.

Furthermore, the project is predicated on taking advantage of the significant advances that are being made in the biological sciences, and especially in the booming field of computer technology. This approach is being used to develop a research database, with one application intended to make empirical estimates of the overall amount of carbon sequestered in the standing biomass of California's almond orchards.

At the core of this project lies the longer-term objective of developing a functional/structural tree model that can simultaneously simulate whole-tree photosynthesis, tree architectural growth, and carbon partitioning within the tree's structure.

At the same time, the model will have great practical value for being able to display the tree's structural development in three dimensions on a computer screen.

The project involves converting and upgrading an existing computer-based simulation model developed for fruit trees—the L-PEACH model—to handle almond data. It makes use of growth and other data collected over two decades from other almond-related studies, including Bruce Lampinen's research on spur dynamics. The model continues to be developed with simulation runs to test the performance of the model.

The project's outcome is anticipated to be an advanced set of analytical and management tools, including the master database. It will also have the capability to be used to predict both long-term outcomes and trends.

Project Cooperators and Personnel: Bruce Lampinen, Claudia Negron, Katherine Jarvis-Shean, Sergio Tombesi, Elias Marvinney, David Da Silva, and Sam Metcalf, University of California, Davis

For More Details, Visit

- Poster location 61 Exhibit Hall A + B during the Almond Conference; or on the web (after January 2016) at Almonds.com/ResearchDatabase
- 2014 - 2015 Annual Reports CD (14-PREC1-DeJong); or on the web (after January 2016) at Almonds.com/ResearchDatabase
- Related projects: 15-PREC8-Zwieniecki, 15-AIR2-Smart; 14-STEWCROP4-Kimmelshue; 13-AIR8-Kendall