

# Assessing the Carbon Budget of Almond Trees and Developing a 3-D Computer Model of Tree Architectural Growth and Dry-Matter Partitioning in Almond

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## PROJECT SUMMARY

### Objectives:

- Develop a master research database on tree growth, biomass activity, dry-matter partitioning, and carbon and nitrogen assimilation, utilization, and distribution in almond and related species.
- 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:

This ongoing, 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 twin 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 will be used to

develop the research database, with one application intended to be estimating 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 researchers plan to bring this *in silico* device to fruition by converting and upgrading existing computer-based simulation model developed for fruit trees—the L-PEACH model—to handle almond data. They also will make use of growth and other data collected over two decades from other almond-related studies, including Bruce Lampinen's research on spur dynamics.

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 of being able to be used to predict both long-term outcomes and trends.

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

### For More Details, Visit

- Poster location 16, Exhibit Hall, Session 3; or on the web (after January 2011) at [AlmondBoard.com/AICposters](http://AlmondBoard.com/AICposters)
- 2009-10 Annual Report CD (09-PREC1-DeJong); or on the web (after January 2011) at [AlmondBoard.com/ResearchReports](http://AlmondBoard.com/ResearchReports)