Development of a Statewide Spatial Database (Mapping) for Walnuts, Almonds, and Pistachios

Project Leader: Joel Kimmelshue
Land IQ, 2020 L Street, Suite 110, Sacramento, CA 95811
(916) 265-6350, jkimmelshue@landiq.com

PROJECT SUMMARY

Objectives:

- Identify imagery sources that are the most suited to analyzing almond orchard characteristics
- Use remotely sensed imagery to determine orchard age
- Determine if orchard age is correlated to orchard biomass in remote sensing analysis
- Explore the statistical relationship between various remotely sensed image texture characteristics and almond orchard biomass
- Begin to establish a statistically valid method to predict carbon stocks in almond orchards
- Demonstrate the use of LiDAR in determining variability in orchard height

Background:

The overall objective of the on-going project, of which this effort was a part, is to improve the industry understanding of how pruning management and tree removal techniques impact soil carbon stocks, air quality and greenhouse gas emissions. To this end, the spatial database of almond acreage and biomass determinations across California needs to be improved.

Determining biomass at the time of orchard removal is important in accurately estimating carbon stocks held in almond orchards, especially because pruning has decreased making removal a more significant source of biomass. While traditional methods for estimating tree biomass from random sampling are successful, they are time-consuming, labor intensive, and costly. Remote sensing analysis is used frequently to extend field-level assessments over large regions in a cost-effective manner, and has great potential as a tool for estimating carbon stocks in almond orchards on a large scale.

Two sources of remotely sensed imagery (available to the public at no cost) and an analytical technique called object-based identification analysis (OBIA) were used to explore the relationship between measured biomass, orchard age, and vegetative (canopy) cover in 36 almond orchards in California. The orchards were in five counties that produce a major proportion of the California almond crop.

Results indicated that green chipped weight measured during orchard removal was correlated to canopy cover as determined using remote sensing analytical techniques. Certain remotely sensed image texture characteristics also correlated well with vegetative cover. Orchard age, determined by remote sensing image analysis, was not a good predictor of orchard biomass.

The significance of these findings is that remotely sensed imagery and analytical techniques can be used to estimate almond orchard biomass as well as other almond orchard characteristics. This eliminates the need to acquire costly and time-consuming field data to provide this information over a large extent of almond acreage. This information can be used to improve the spatial database of almond acreage statewide, and provides valuable inputs for modeling the effects of management practices on carbon flux in orchard soils.

Project Cooperators: William Salas, Applied Geosolutions, LLC. Ted DeJong, David Smart, UC Davis

For More Details, Visit

- Poster location 70, Exhibit A + B during the Almond Conference; or on the web (after January 2015) at Almonds.com/ResearchDatabase
- Related projects: 14-PREC1-Dejong, 12-STEW4-Kimmelshue