

## **CALIFORNIA AG 20/20 PROJECT - DEVELOPING REMOTE SENSING AIDS FOR COTTON**

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### **Abstract**

The Ag 20/20 Project is a cooperative, multidisciplinary program comprised of a large and diverse group of producer, agribusiness, extension, and research cooperators. The goal of the project is to develop and apply geospatial and remote sensing technologies to cotton production and cotton field management practices in California. In 2003, multispectral and hyperspectral remote imagery was collected on over 2,200 acres of cotton on 17 fields in two site locations: Sheely Farm near Lemoore and the Shafter Research and Extension Center in Shafter. Principal investigators used the imagery and other field data to conduct eleven different research trials on the project and to use remote sensing to estimate a diverse variety of agronomic conditions for cotton. Detailed reports on several of the research field trials, including Research Projects #3, #4 and #8, are presented elsewhere within these proceedings. A field day was held on July 24, 2003 on the Sheely Farm where field seminars and commercial exhibitions demonstrated new research information and technologies for cotton production.

### **Ag 20/20 Goals and Objectives**

The goal of the Ag 20/20 Project is to develop and apply geospatial and remote sensing technologies to cotton production and cotton field management practices in California. These technologies provide spatial and agronomic-based information that is difficult to obtain during routine or conventional farming operations, but is useful for improving field management decisions and site specific applications to crops and soils. This project was initiated to develop new production methods through research and demonstrate their use on a commercial cotton farm. A primary objective of the Ag 20/20 Project is to develop and field test the use of current and new remote sensing and precision ag technology to make better decisions that improve cotton yield and fiber production. This poster display is a brief overview of the Ag 20/20 Project and the research projects conducted by principal investigators. Results from several field research trials on the Ag 20/20 site are being presented during these 2004 Beltwide Cotton Conference meetings and within these proceedings.

The Ag 20/20 Project is a cooperative, multidisciplinary program comprised of a large and diverse group of producer, agribusiness, extension, and research cooperators. Team members originate from the University of California, Davis, UC Cooperative Extension, the United States Department of Agriculture (USDA) Agricultural Research Service (ARS), the National Aeronautics and Space Administration (NASA), California State University, Fresno, AZCAL Management Company, and several commercial agribusiness and remote sensing companies.

### **Site Locations**

Research, extension demonstrations, and field activities in the Ag 20/20 Project are conducted on two site locations in the San Joaquin Valley: the Sheely Farm near Lemoore (Figure 1) and at the Shafter Research & Extension Center, Shafter. In 2003, over 2,200 acres of cotton on 17 fields were used by the Project. The fields on the Sheely farm ranged from 150 to 189 acres in size and are surface irrigated with canal water. Soils are typically deep, neutral to high pH, low organic matter content (< 1.5%), clay loam with high clay content in the subsurface horizons, and contain high variability in excess salts within fields. Fields on the Shafter Research and Extension Center are small (1 to 6 acres) to support research plots and have soils that are deep, sandy loam texture, well drained, neutral to slightly alkaline pH, low organic matter content, and often have coarse sandy intrusions.

### **Research Projects and Demonstrations**

Eleven research trials requested remote sensing flight data during 2003 (Table 1). These trials were conceived to develop new methods for estimating agronomic conditions or properties of cotton canopy and soils, with the goal to utilize remote sensing for making better field decisions. Field management decisions that could be improved by this research include soil salinity reclamation, seasonal growth regulator and desiccant application, pest applications for spider mite and aphid control, and seasonal nitrogen management. Reports on some of these trials, including Research Project #8 – Leaf and Canopy Indices to Quantify Nitrogen in Cotton, Research Project #3 – Use of Remotely Sensed Imagery for Variable Rate Applications

of Plant Growth Regulator, and Research Project #4 - Evaluation of Remote Sensing Techniques to Improve Sampling and Management of Cotton Aphids and Spider Mites in SJV Cotton, are presented elsewhere within these proceedings.

A Precision Ag Field Day was held on the Sheely Farm site on July 24, 2003. Researchers provided field seminars to a large audience of producers and industry representatives. Exhibitors offered hands-on demonstrations of precision ag and remote sensing tools that are available to aid decision-making in cotton production.

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Table 1. Remote sensing and precision ag research activities on the Ag 20/20 project during 2003.

<b>Principal Investigator</b>	<b>Project Name</b>	<b>Agronomic Conditions Estimated</b>
1. M. Whiting, S. Ustin	Determining Soil Carbon Using Hyperspectral Imagery	soil organic matter soil carbonates soil surface moisture
2. J. Fridgen	Use of Remotely Sensed Imagery for Variable Rate Application of Harvest Aids	leaf area index plant height percentage open bolls prescription rates
3. M. Bethel	Use of Remotely Sensed Imagery for Variable Rate Applications of Plant Growth Regulator	plant height total nodes internodal distances prescription rates
4. L. Godfrey, K. Keilor, D. Reisig	Evaluation of Remote Sensing Techniques to Improve Sampling and Management of Cotton Aphids and Spider Mites in SJV Cotton	spider mite damage aphid damage pest numbers detect hot spots
5. L. Godfrey, K. Keilor	Can Lygus Bug Management in Cotton Be Improved Through Remote Sensing?	Lygus population
6. L. Godfrey, K. Keilor	Sticky Cotton and Remote Sensing	sticky cotton
7. S. Kefauver, S. Ustin	Cotton Yield Prediction (COTTONS model)	early season yield
8. J. Ojala	Nitrogen Quantification in Cotton	leaf/canopy nitrogen
9. R. Plant	Variable Rate N	compare NDVI and NRI with nitrogen rates
10. G. Tierre	Irrigation & Water Manage- ment	
11. N. Gat, G. Schriener	Cotton Yield Prediction	cotton yield

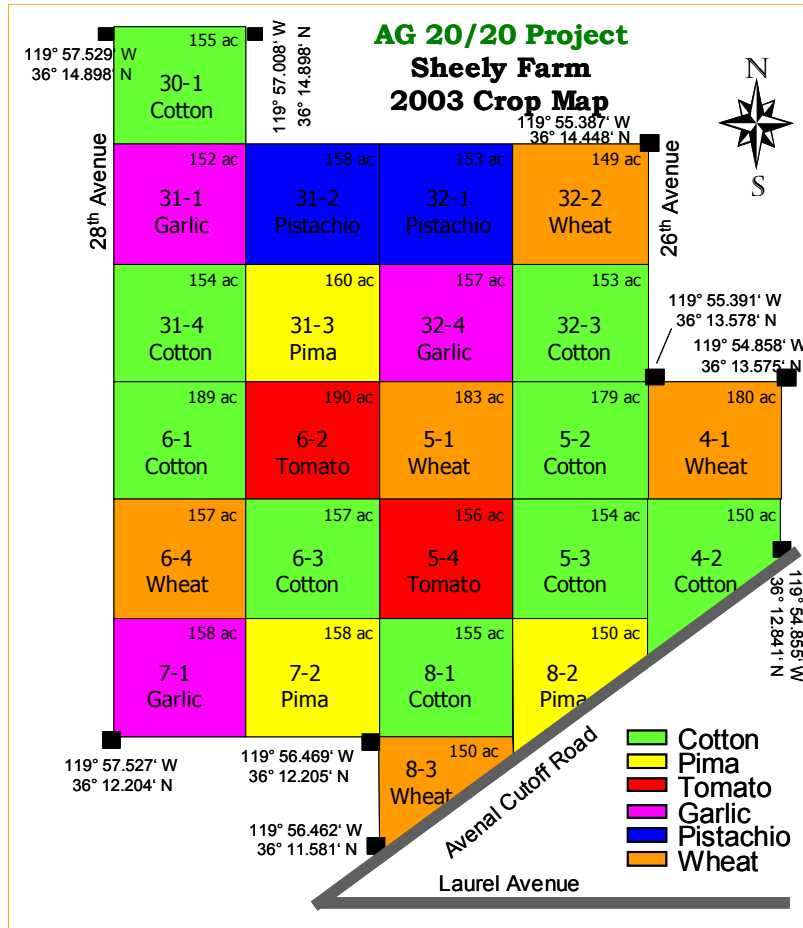


Figure 1. 2003 crop map of Sheely farm site on the Ag 20/20 Project.