ENVIRONMENTAL
&
PLANT DYNAMICS
MANAGEMENT UNIT

E&PD Organization

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                    │     ENVIRONMENTAL       │
                    │  AND PLANT DYNAMICS     │
                    │                         │
                    │     Bruce Kimball       │
                    │    Research Leader      │
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GLOBAL CHANGE	REMOTE SENSING	NEW CROPS
B.A.Kimball Soil Scientist	P. J. Pinter Jr. Research Biologist	T. A. Coffelt Research Geneticist
Jeffrey W. White Research Physiologist	E.M. Barnes Agricultural Engineer	D. A. Dierig Research Geneticist
G. W. Wall Plant Physiologist	T. R. Clarke Physical Scientist	F. S. Nakayama Research Chemist
N. R. Adam Plant Physiologist	G. J. Fitzgerald Research Agronomist	
P.J. Pinter Jr. Research Biologist	D. Hunsaker Agricultural Engineer	
	B. A. Kimball Soil Scientist	
	G.W. Wall Plant Physiologist	

Mission

The Environmental and Plant Dynamics (E&PD) Research Group seeks to develop optimum resource management strategies for meeting national agricultural product requirements within the context of possible changes in the global environment. There are three main research thrusts: The first is predicting the effects of the increasing atmospheric CO_2 concentration and climate change on the yield and water use of crops in the future. The second thrust seeks to improve agricultural water management utilizing remote sensing approaches for observing plant conditions and biophysical processes which are amenable to large scale resource monitoring using aircraft- and satellite-based sensor systems. The third research thrust is to develop new industrial crops with unique high value products and lower water requirements for commercial production within the context of changing environments.

E&PD RESEARCH STAFF

NEAL R. ADAM, B.S., M.S., Ph.D., Plant Physiologist
Research regarding physiological, biochemical and molecular responses of wheat to CO_2 enrichment in FACE crop canopy experiment. Establish protocol for enzyme activity assays, SDS-PAGE and other biochemical procedures on leaf samples. Design and implement data collection and processing tools.

EDWARD M. BARNES, B.S., M.S., Ph.D., Agricultural Engineer
Remote sensing applications for farm management; consideration of approaches that integrate remotely-sensed measurements with crop growth models and decision support systems.

THOMAS R. CLARKE, B.A., Physical Scientist
Remote sensing for farm management, thermal and optical radiometry, and instrument calibration.

TERRY A. COFFELT, B.S., M.S., Ph.D., Research Geneticist-Plants
Breeding, genetics, and germplasm evaluation of new crops--guayule, lesquerella, and vernonia; development of acceptable production practices.

DAVID A. DIERIG, B.S., M.S., Ph.D., Research Geneticist-Plants
Breeding, genetics, germplasm collection and evaluation of new industrial crops with unique, high-value products, including lesquerella, vernonia, and guayule.

GLENN J. FITZGERALD, B.A., M.S., Ph.D., Research Agronomist
Application of geospatial technologies to site specific farming, multispectral and hyperspectral remote sensing for detection and identification of plant stress and anomalies.

DOUGLAS J. HUNSAKER, B.S., M.S., Ph.D., Agricultural Engineer
Effects of soil and irrigation spatial variability on crop water use and yield in large irrigated fields; level basin irrigation design and management procedures for applying light, frequent water applications to cotton; CO2 effects, in particular, of evapotranspiration in the free-air CO2 enrichment (FACE) environment; evaluation of water requirements and irrigation management of new industrial crops--lesquerella and vernonia.

BRUCE A. KIMBALL, B.S., M.S., Ph.D., Research Leader for E&PD and Supervisory Soil Scientist
Effects of increasing atmospheric CO_2 and changing climate variables on crop growth and water use; free-air CO_2 enrichment (FACE), and CO_2 open-top chambers and greenhouses; micrometeorology and energy balance; plant growth modeling.

FRANCIS S. NAKAYAMA, B.S., M.S., Ph.D., Research Chemist
New crops such as guayule (for latex rubber and resin), lesquerella (hydroxy fatty acid) and vernonia (epoxy fatty acid); including extraction and analytical techniques and by-product uses for the various components; Editor-in-Chief of Industrial Crops and Products, an International Journal.

PAUL J. PINTER, JR., B.S., M.S., Ph.D., Research Biologist
Applications of remote sensing technology to management of agricultural resources and research in plant sciences; effects of elevated CO_2 on biophysical properties of plants.

GERARD W. WALL, B.S., M.S., Ph.D., Plant Physiologist
Derivation of experimental databases to quantify growth, development, and physiological response of agronomic crops to full-season CO_2 enrichment; development of deterministic and stochastic digital simulation models of the soil-plant-atmosphere continuum in response to a CO_2 enriched environment.