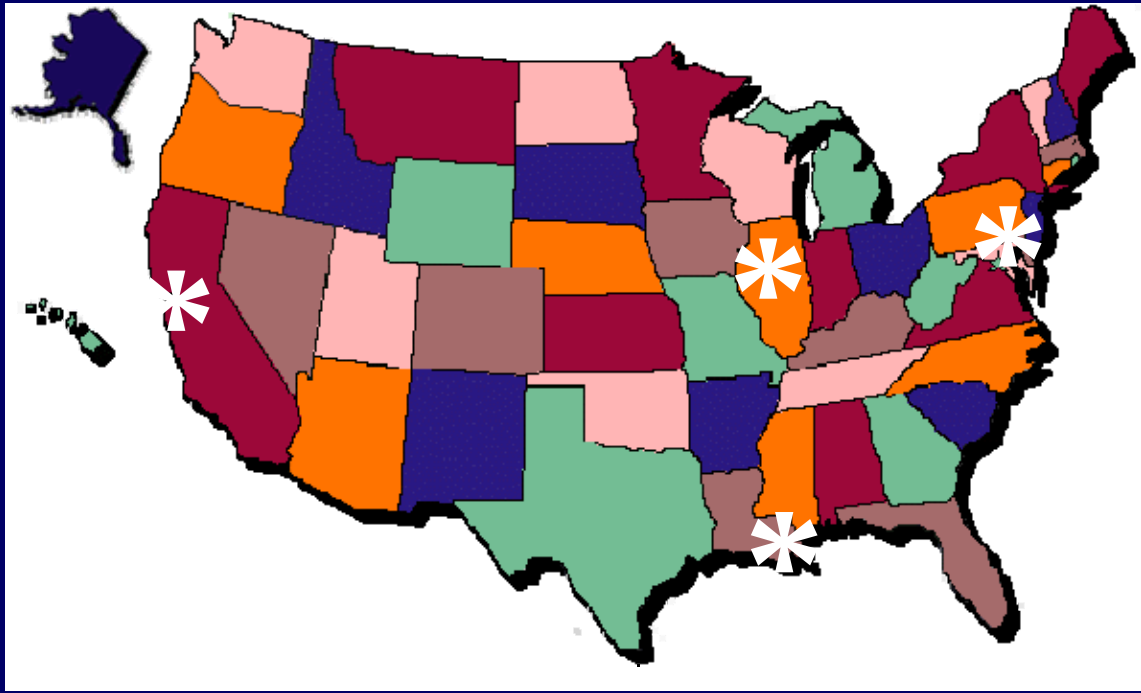
History & Research Programs of SRRC

Ed Cleveland
Center Director

The Southern Regional Research Center and three sister laboratories were established by the 1938 Agricultural Adjustment Act of Congress.

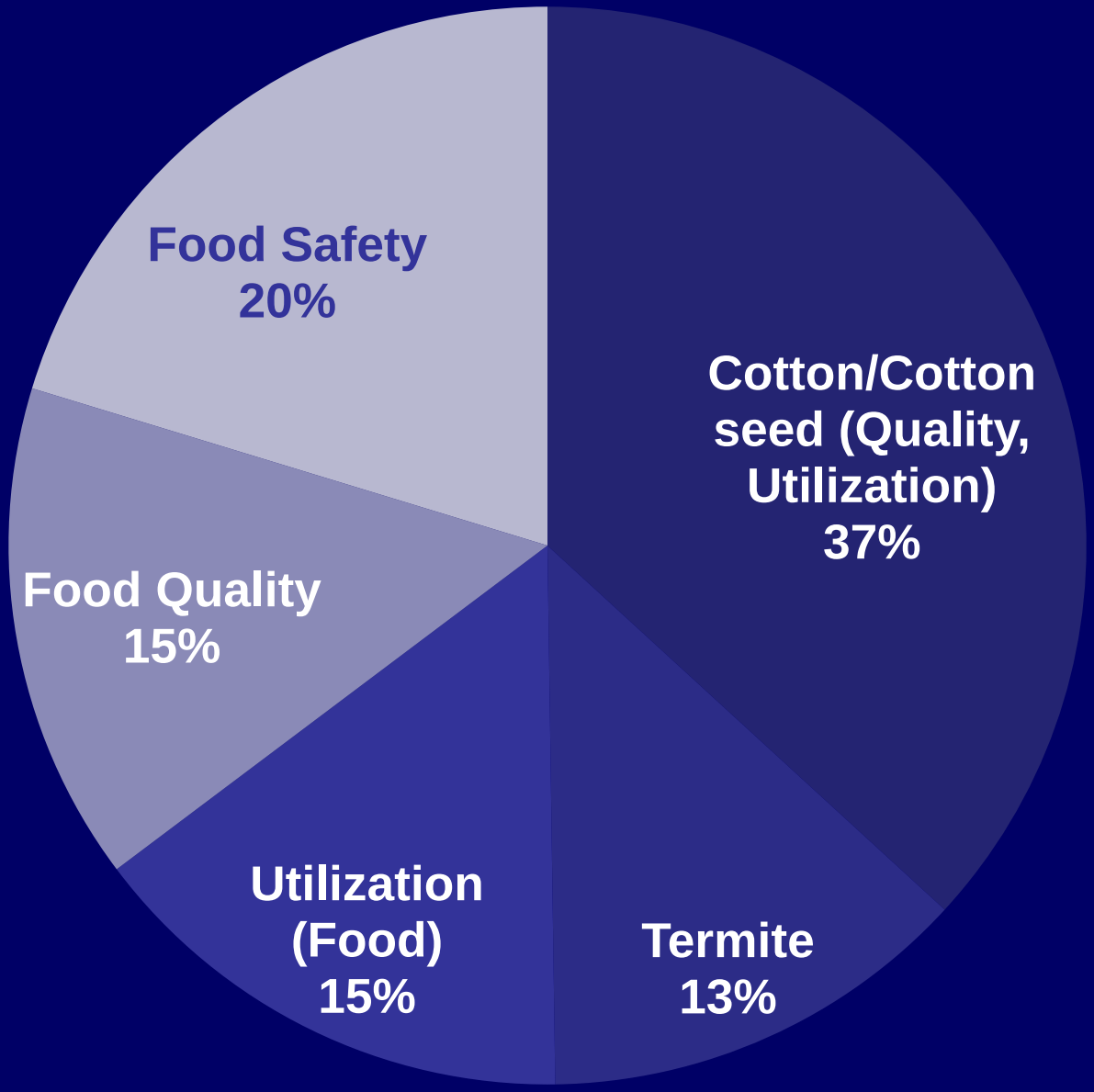


"The aim of the laboratories is to develop new and improved uses for American farm products by providing industry with the basic data and technical know-how for turning crops into manufactured goods" Dr. Walter M. Scott, Director *The Cotton Gin and Oil Mill Press* Oct 1, 1949

Southern Regional Research Center
New Orleans, Louisiana

- Built in 1939-1940
- Local budget of $25 Million
- 70 Scientist Positions, 130 support employees
- Commodities: Cotton, Cottonseed, Rice, Peanuts, Corn, Catfish, Sugar, Fruit, Soybean
- Historically recognized for development of durable press cotton fabrics

SRRC Research Efforts (%)



Cotton Chemistry & Utilization

Chemically-based New Uses & Processes for Cotton

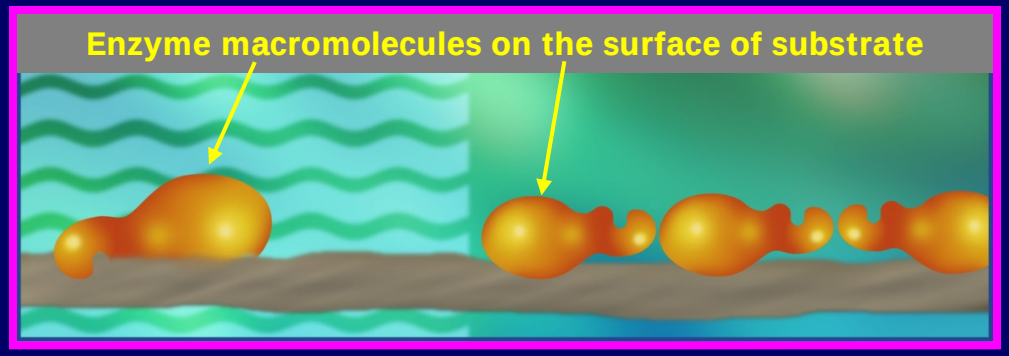
Dr. Brian Condon

Medical textile chemistries for antibacterial, bed sores and wound treatments

New FR chemistries for mattresses and clothing

THE OLD DAYS. While working in the 1950s at SRRC, Dr. Ruth Benerito developed a key process that led to permanent-press cotton fabrics.

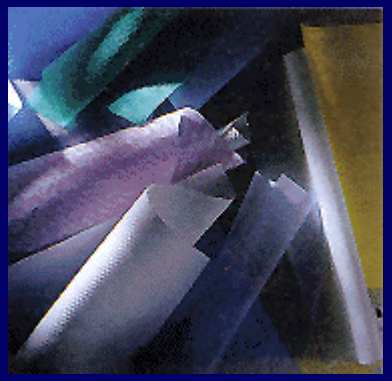
Enzymatic cotton finishing – environmentally friendly

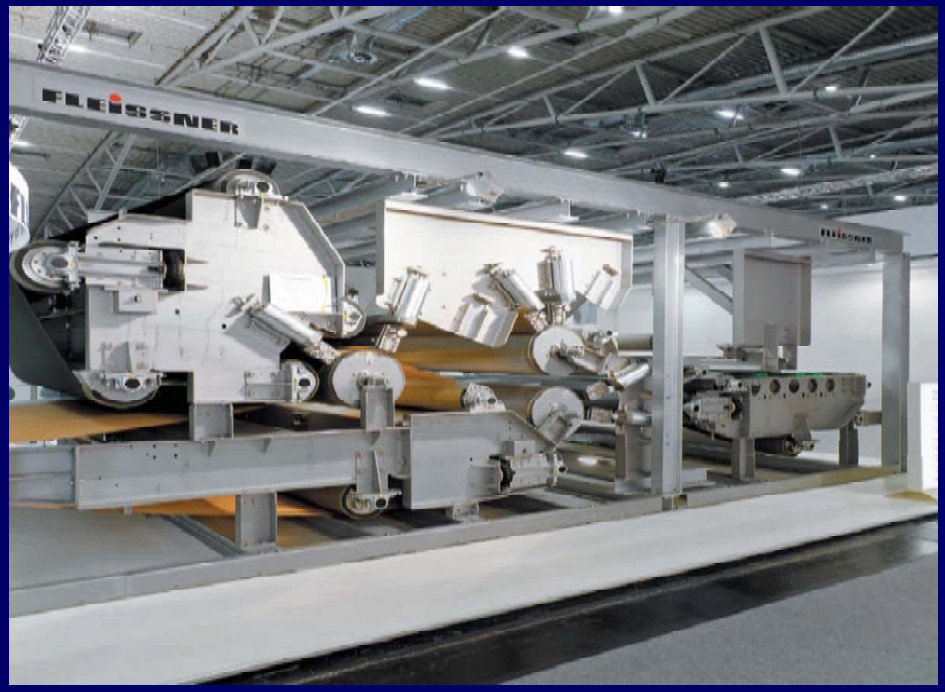


Cotton Chemistry & Utilization (continued)

Nonwoven Fabric Formation And New Product Development

- $2 million investment in the Cotton Nonwovens Research Laboratory (only one in the world focused on cotton)
- Fiber directly to fabric (no spinning, weaving or knitting)
- Applications include wipes, industrial fabrics, medical fabrics, personal care products, automotive, disposable garments
- Sustainability is driving cotton expansion in this area





COTTON STRUCTURE & QUALITY

Dr. Jim Rodgers

Develop and improve the methods for assessing quality and structural attributes of cotton fiber through all stages of production and processing.

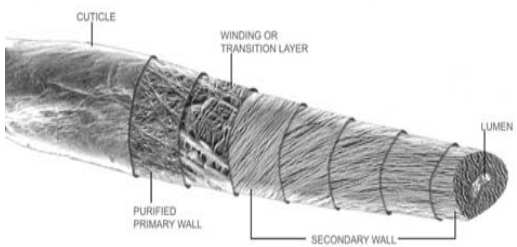
Improve understanding of the cotton fiber structural components such as primary wall composition and structure.

Obtain complete understanding of the relationship of water to cotton and its impact on fiber structure and properties and processing characteristics

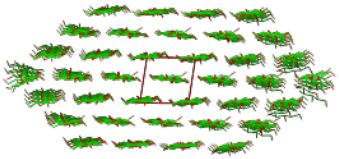
Develop methods of measuring key cotton fiber-yarn-fabric properties

Demonstrate the value of adding new quality measurements to better predict cotton processing efficiency and product quality (textile Pilot Plant; process 50 grams to 50 pounds)

Develop new quality assessment tools for cotton breeders.

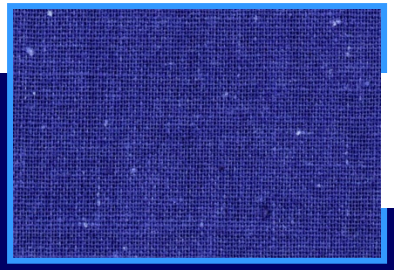


Microscopy & Crystallite Orientations in Cotton Fiber



Modeled Crystal Structure of Cellulose Iβ

At-Line & Field Measurements by Spectroscopy



Measurement of Contaminants & Imperfections in Fabrics by Image Analysis

Cotton Fiber Bioscience

Dr. David Fang

A new unit focusing on the use of molecular biology, biotechnology and other laboratory techniques to elucidate molecular processes involved and influence through manipulation of key genes the development of cotton fibers.

Commodity Utilization Research Dr. Thomas Klasson

Enzymatic Processes for Increasing Industrial Utilization of Vegetable Oils

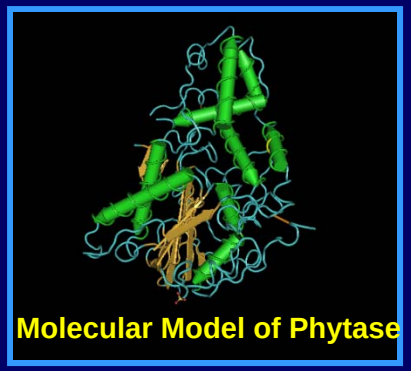
Identify oil-forming (and oil-storing) biological pathways in the tung tree & develop gene expression systems in yeast and agricultural plants (metabolic engineering).

Develop Enhanced Phytase for Animal Feed to Increase Nutritional Availability of the Bound Phosphorus in Feed (eg. soybean meal)

Improve activity and broaden substrate specificity of enzyme Responsible for breakdown of phytic acid (in soybean meal) through site-directed mutagenesis of enzyme's active site.

Agricultural By-Products as Adsorbents for Environmental Remediation

Develop biochars and activated carbon products from plant and animal waste and determine effectiveness of removing environmental contaminants.



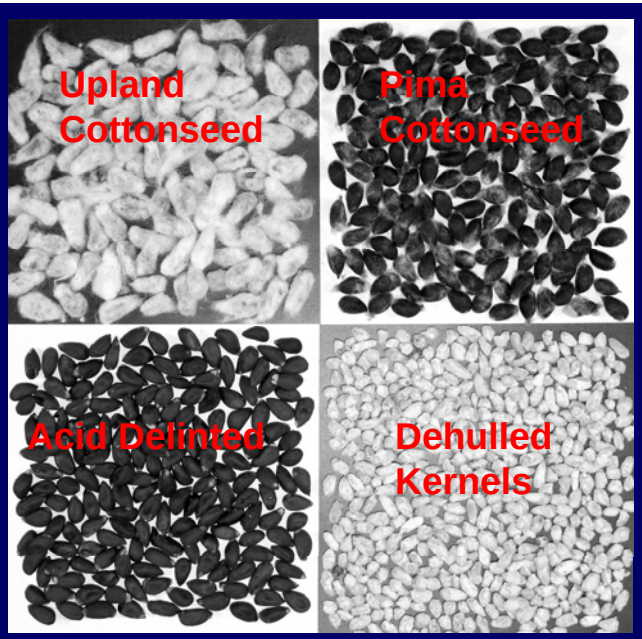
Commodity Utilization Research (Continued)

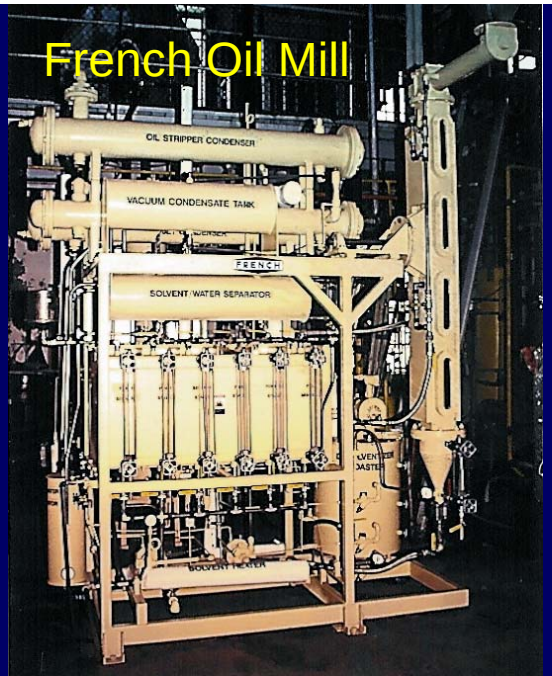
Value-Added Products from Cottonseed

ID cotton genotypes with low saturated fatty acids and high oleic acids. Develop gossypol derivatives with enhanced bioactivity as anti-cancer and anti-fungal agents. Produce and modify cottonseed protein isolates to use as industrial biodegradable adhesives. Develop hydrogenation strategies to produce low trans-fatty acid partially hydrogenated cottonseed oil.

Develop Technologies to Prevent and Reduce Sugar Processing Problems in Industry

Develop processing technologies for the production of very high quality (e.g. low color) raw sugars in sugarcane factories. Develop markers for juice deterioration and problems associated with green cane that can be used to predict processing problems. Improve postharvest processing of sweet sorghum and sugarcane for syrup and biofuel production.





FOOD AND FEED SAFETY RESEARCH

Dr. Deepak Bhatnagar

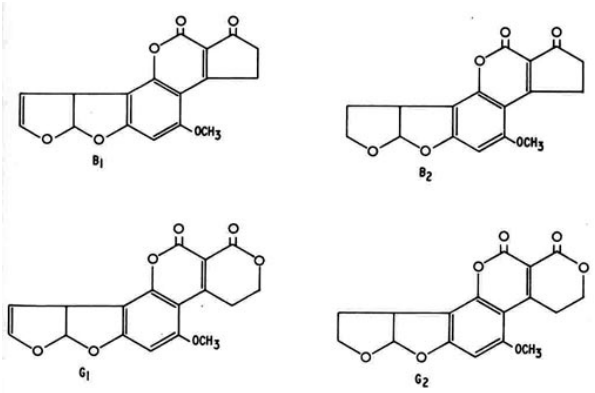
ENHANCE DISEASE RESISTANCE IN CROPS TO AFLATOXIN CONTAMINATION

-Incorporate genes for resistance (breeding, gene insertion) to fungal infection or that interfere with toxin gene expression and toxin biosynthesis.

APPLY COMPETITIVE MICROBES TO EXCLUDE AFLATOXIN PRODUCING FUNGI

-Application of non-toxic fungi on the crop that can outcompete their aflatoxin producing "cousins" in crop environments.

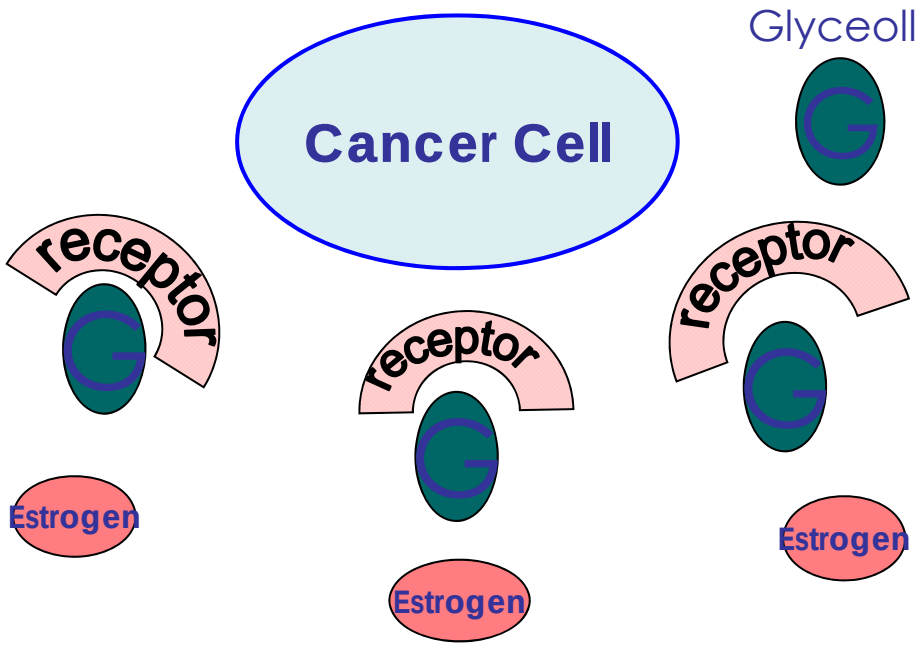
Aspergillus flavus invasion of cotton bolls and seed resulting in contamination with aflatoxins

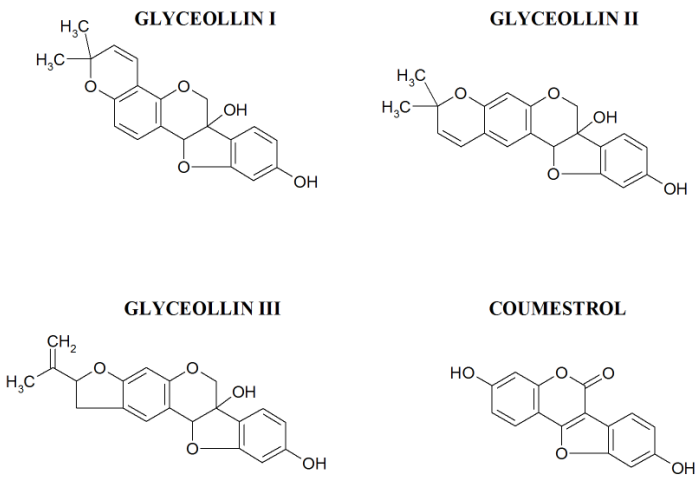


Chemical structures of the aflatoxins

Crops affected: Corn, Cottonseed, Peanut, and Tree Nuts

DISCOVERY OF ANTIESTROGENIC & ANTICANCER ISOFLAVONOIDS (Dr. Steve Boue)



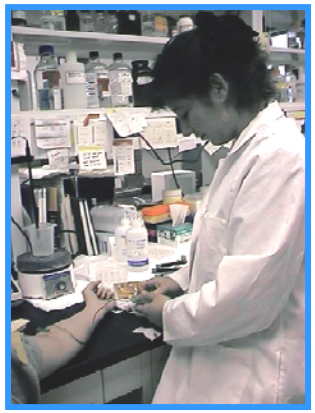


Glyceollins, which are phytoalexins, defense compounds induced in soybean seed by fungal elicitors, were found to be particularly good antiestrogenic isoflavonoids. They can block estrogen from attaching to receptors on cancer cells (e.g. breast cancer) where estrogen could initiate cancer cell proliferation. The compounds blocked the proliferation of breast cancer cells in vitro and in vivo (mouse model).

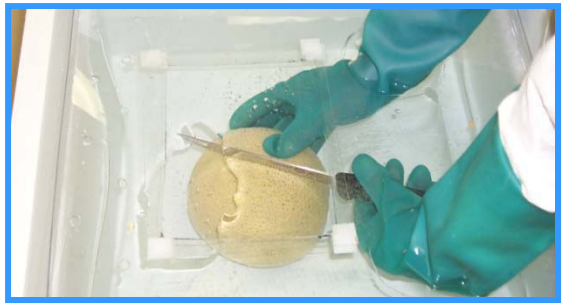
SRRC, ARS, USDA
Univ. of Toledo
Tulane-Xavier

Food Processing & Sensory Quality

Dr. Michael Dowd (acting Research Leader)



- Capture the unique nutritional and functional attributes of rice in value-added products
- Reduce the allergenicity of peanuts and tree nuts
- Assess and predict crop sensory quality
- Improve the sensory quality and shelf life of fresh-cut fruit products
- NEW: project on functional beverages from fruits
- Mitigate off-flavors in pond-raised catfish



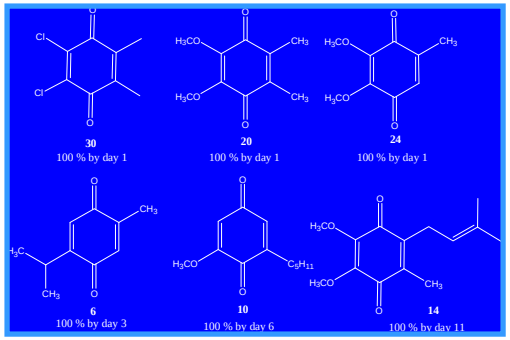
Food Processing & Sensory Quality (continued)

Food sources of nutrients and dietary intake patterns associated with excess adiposity in U.S. children

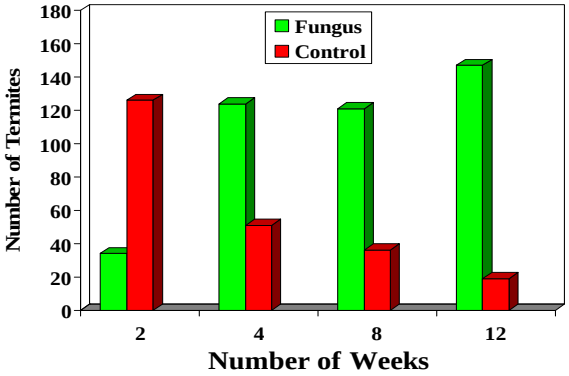
In cooperation, with
Louisiana State University,
Baton Rouge, La.

FORMOSAN SUBTERRANEAN TERMITE RESEARCH

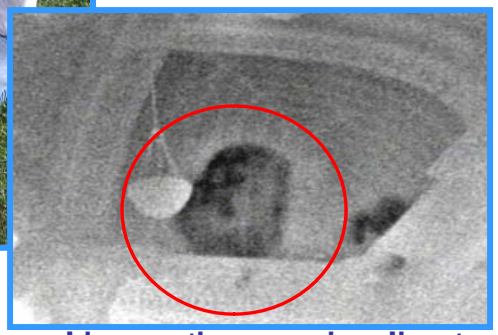
Dr. Alan Lax, Research Leader



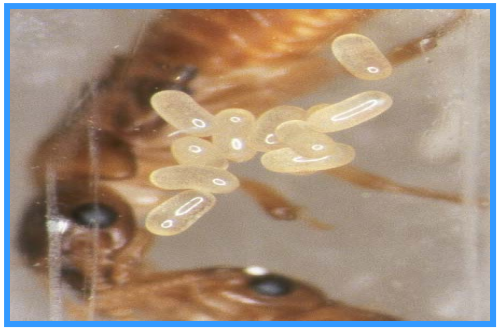
Natural products being tested as termiticides



Fungus degraded wood is preferred by termites.



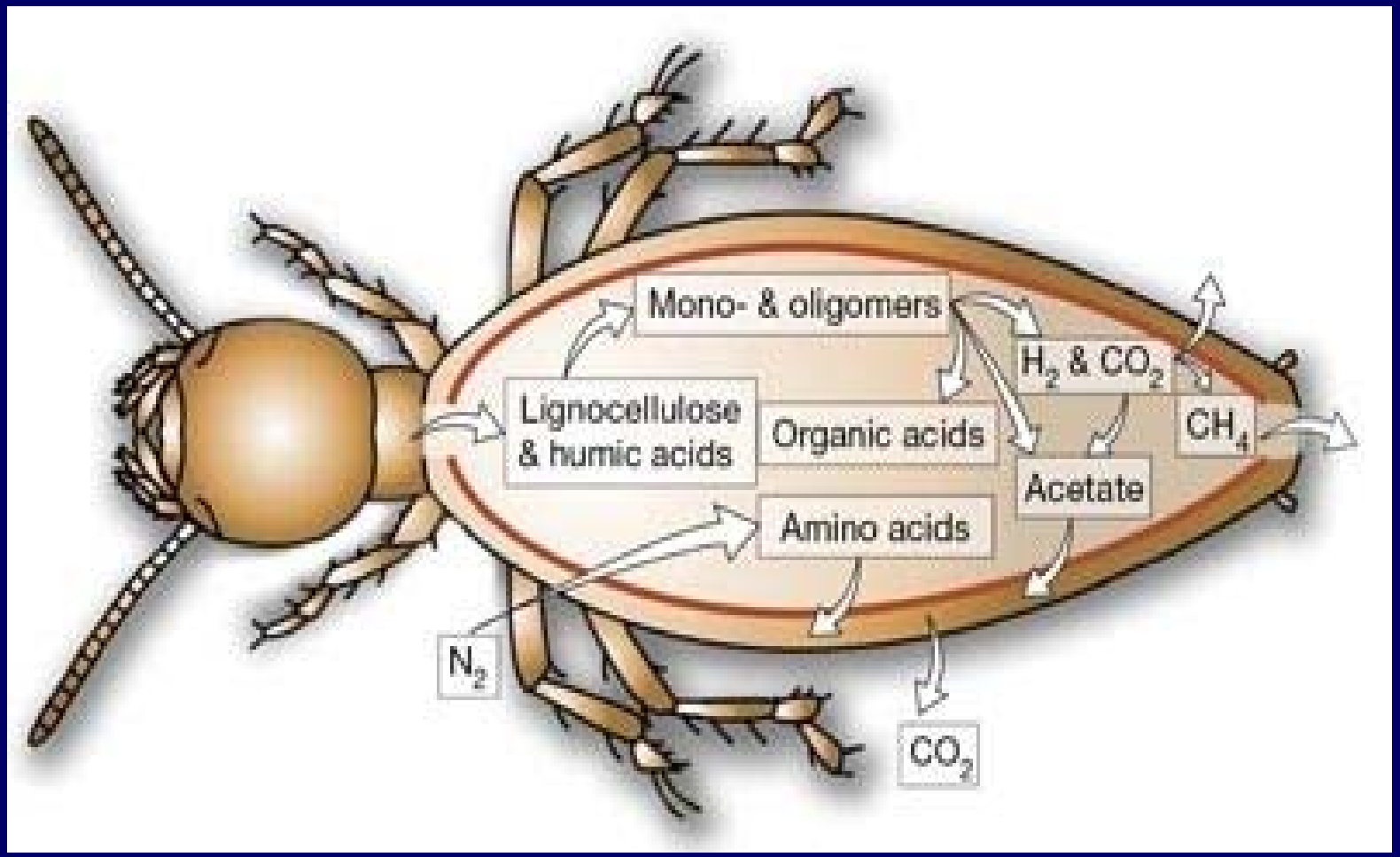
Acoustic and infrared inspections are leading to improved discovery and treatment of termite colonies.



Hormonal regulation of colony development could lead to new control measures.

Effective fungi are being formulated for improved biological control.

Termite is Efficient Bioreactor



BIOMASS CONVERSION: The termite is capable of converting just one sheet of paper into two liters of hydrogen

lignocellulose → sugar, H_2, CH_4, acetate

New Orleans' French Quarter Project

- USDA-SRRC
- LSU Agricultural Center
- New Orleans Mosquito & Termite Control Board
- Pest Management Professionals

Area-wide Control Strategy Reduces FST Infestations

OPERATION TERMITE FULL STOP

Alate (winged forms) Numbers down 48 - 78%

Infested Structures: 27 % in 2003
6 % in 2009