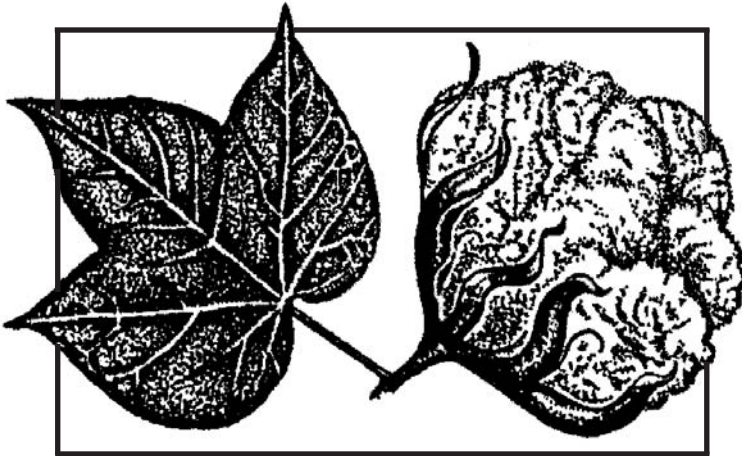


Summaries of Arkansas Cotton Research 2001



Edited by Derrick M. Oosterhuis

ARKANSAS AGRICULTURAL EXPERIMENT STATION
Division of Agriculture University of Arkansas
October 2002 Research Series 497

This publication is available on the Internet at www.uark.edu/depts/agripub/publications

Additional printed copies of this publication can be obtained free of charge from Communication Services, 110 Agriculture Building, University of Arkansas, Fayetteville, AR 72701.

Layout and editing by Marci A. Milus

Technical editing and cover design by Cam Romund

Arkansas Agricultural Experiment Station, University of Arkansas Division of Agriculture, Fayetteville. Milo J. Shult, Vice President for Agriculture and Director; Gregory J. Weidemann, Dean, Dale Bumpers College of Agricultural, Food and Life Sciences and Associate Vice President for Agriculture–Research, University of Arkansas Division of Agriculture. PB1150/QX5. The University of Arkansas Division of Agriculture follows a nondiscriminatory policy in programs and employment.

ISSN:1051-3140 CODEN:AKAMA6

UofA

UNIVERSITY OF ARKANSAS

DIVISION OF AGRICULTURE

spine copy

Summaries of Arkansas Cotton Research 2001

Oosterhuis

AAES



**SUMMARIES OF
ARKANSAS COTTON
RESEARCH 2001**



Edited by Derrick M. Oosterhuis



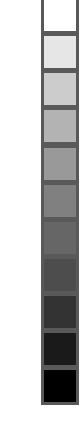
**Arkansas Agricultural Experiment Station
Fayetteville, Arkansas 72701**





CONTRIBUTORS

Agudelo, Paula, Graduate Assistant, Plant Pathology Department, Fayetteville
Ahrendsen, Bruce L., Associate Professor, Agricultural Economics and Agribusiness
Department, Fayetteville
Baker, William H., Associate Professor, Arkansas State University, Jonesboro
Barrentine, James L., Professor and Head, Crop, Soil, and Environmental Sciences
Department, Fayetteville
Bateman, Ronnie J., Pest Management Associate, Southwest Research and Extension
Center, Hope
Benson, Ray, Research Associate, Northeast Research and Extension Center, Keiser
Bierlen, Ralph W., Former Research Associate, Agricultural Economics and
Agribusiness Department, Fayetteville
Bourland, Fred M., Director, Northeast Research and Extension Center, Keiser
Branson, Jeffrey W., Weed Science Associate, Southeast Research and Extension
Center, Monticello
Brown, Robert S., Graduate Assistant, Crop, Soil, and Environmental Sciences
Department, Fayetteville
Bryant, Kelly J., Area Extension Specialist - Farm Management, Southeast Research
and Extension Center, Monticello
Capps, Chuck, Pest Management Technical Support Specialist, Southeast Research
and Extension Center, Monticello
Coker, Dennis L., Research Specialist, Crop, Soil, and Environmental Sciences
Department, Fayetteville
Conway, Hugh E., Graduate Assistant, Entomology Department, Fayetteville
Coy, Steven, Research Specialist - Cotton Entomology, Arkansas State University,
Jonesboro
Dighe, Nilesh, Graduate Assistant, Crop, Soil, and Environmental Sciences Depart-
ment, Fayetteville
Dixon, Bruce L., Professor, Agricultural Economics and Agribusiness Department,
Fayetteville
Feng, Chunda, Professional Assistant, Crop, Soil, and Environmental Sciences
Department, Fayetteville
Fisher, April, Jefferson County Extension Agent - Agriculture, Cooperative Extension
Service, Pine Bluff
French, Ned, Field Development Scientist, Eden Biosciences, Little Rock
Glover, Robert E., Research Specialist, Northeast Research and Extension Center,
Keiser
Gomez, S. Karen, Graduate Assistant, Crop, Soil, and Environmental Sciences
Department, Fayetteville
Greene, Jeremy, Extension Entomologist, Southeast Research and Extension Center,
Monticello
Groves, Frank, Research Specialist, Southeast Branch Experiment Station, Rohwer





Hackman, George, Agronomic Systems Manager, Monsanto Co., Tumbling Shoals
Hammack, Jason, undergraduate, Crop, Soil, and Environmental Sciences Department, Fayetteville
Hendrix, Bill, Technical Assistant, Crop, Soil, and Environmental Sciences Department, Fayetteville
Hopkins, John D., Entomology Associate Specialist, Cooperative Extension Service, Little Rock
Hornbeck, Jimmy, Research Specialist, Cotton Branch Station, Marianna
Ihring, Rob, Roundup Cotton Specialist, Monsanto, Collierville, TN
Johnson, Donald R., Pest Management Section Leader and IPM Coordinator, Cooperative Extension Service, Little Rock
Kelly, Steven R., County Extension Agent, Desha County, Cooperative Extension Service, McGehee
Kennedy, Claude, Resident Director, Cotton Branch Station, Marianna
Kirkpatrick, Terry L., Plant Pathologist, Southwest Research and Extension Center, Hope
Kirst, Robert C., Jr., Research Specialist, Southeast Research and Extension Center, Monticello
Kring, Timothy J., Professor, Entomology Department, Fayetteville
Lorenz, Gus M., III, Extension Entomologist, Cooperative Extension Service, Little Rock
McClelland, Maryilyn R., Senior Research Associate, Crop, Soil, and Environmental Sciences Department, Fayetteville
McConnell, J. Scott, Associate Professor, Crop, Soil, and Environmental Sciences Department, Southeast Research and Extension Center, Monticello
Meek, Cassandra R., Graduate Assistant, Crop, Soil, and Environmental Sciences Department, Fayetteville
Mutondo, Joao E., Graduate Research Assistant, Agricultural Economics and Agribusiness Department, Fayetteville
Namenek, Robin C., Research Specialist, Southeast Research and Extension Center, Monticello
Norton, M. Chad, Staff Chair, Lincoln County Extension Office, Cooperative Extension Service, Star City
Oosterhuis, Derrick M., Distinguished Professor, Crop, Soil, and Environmental Sciences Department, Fayetteville
Paling, Joseph J., Research Associate, Southwest Research and Extension Center, Hope
Parsch, Lucas D., Associate Professor, Agricultural Economics and Agribusiness Department, Fayetteville
Plunkett, Donald E., Cotton Verification Coordinator, Cooperative Extension Service, Little Rock
Rajguru, Satyendra N., Research Associate, Crop, Soil, and Environmental Sciences Department, Fayetteville





Reaper, Jack D., III, Entomology Extension Specialist, Cooperative Extension Service,
 Little Rock

Robbins, Robert T., Professor, Plant Pathology Department, Fayetteville

Robertson, William C. Extension Agronomist - Cotton, Cooperative Extension Service,
 Little Rock

Robinson, Rodrick, Agriculture Student, Arkansas State University, Jonesboro

Smith, Kenneth L., Extension Weed Scientist, Southeast Research and Extension
 Center, Monticello

Sparks, Oscar C., Graduate Assistant, Crop, Soil, and Environmental Sciences
 Department, Fayetteville

Steinkraus, Donald, Professor, Entomology Department, Fayetteville

Stewart, James M., Professor, Crop, Soil, and Environmental Sciences Department,
 Fayetteville

Studebaker, Glenn, Entomologist, Northeast Research and Extension Center, Keiser

Tacker, Phil L., Agricultural Engineer, Cooperative Extension Service, Little Rock

Teague, Tina G., Professor, Arkansas State University, Jonesboro

Tingle, Chris, Agronomist, Northeast Research and Extension Center, Keiser

Tugwell, N. Philip, Professor, Entomology Department, Fayetteville

Villavaso, Eric J., Research Scientist, ARS-USDA, Mississippi State, MS

Vories, Earl D., Professor, Department of Biological and Agricultural Engineering,
 Northeast Research and Extension Center, Keiser

Yates, Chuck, Graduate Assistant, Entomology Department, Fayetteville

Zhang, Jinfa, Research Associate, Crop, Soil, and Environmental Sciences Depart-
 ment, Fayetteville





CONTENTS

Contributors	2
Preface	11
Arkansas Cotton Research Group	13
Acknowledgments	13
Cotton Incorporated and the Arkansas State Cotton Support Committee	14

SUMMARIES OF COTTON RESEARCH IN PROGRESS IN 2001

University Of Arkansas Cotton Breeding Program – 2001 Progress Report

Fred M. Bourland 19



Transgenic And Conventional Cotton Production Systems Evaluation



*Chris Tingle, Glenn Studebaker, Jeremy Greene, Kelly J. Bryant, and
Kenneth L. Smith* 23

Comparison Of Conventional And Transgenic Cotton In Arkansas

*Kelly J. Bryant, William C. Robertson, Gus M. Lorenz, III,
Rob Ihrig, and George Hackman* 30

Bollgard II Performance In Arkansas, 2001

*Gus M. Lorenz, III, Don R. Johnson, John D. Hopkins, Jack D. Reaper,
April Fisher, and M. Chad Norton* 36

Comparing The Last Effective Boll Populations In Ultra-Narrow-Row and Conventional Cotton

Earl D. Vories and Robert E. Glover 42

Determining The Optimal Timing For The Final Irrigation On Arkansas Cotton

Earl D. Vories, Jeremy Greene, Tina G. Teague, and William C. Robertson 48



Improving Cotton Irrigation Scheduling In Arkansas
Earl D. Vories, Phil L. Tacker, and Robert E. Glover 54

**Physiological Characterization Of Cotton Genotypes
In Response To Water-Deficit Stress**
Cassandra R. Meek and Derrick M. Oosterhuis 59

**Genotypic and Environmental Effects On Partitioning
In The Cotton Plant and Boll For Explaining Yield Variability**
Robert S. Brown, Derrick M. Oosterhuis, and Dennis L. Coker 64

Field Evaluation Of Plant Growth Regulators
Derrick M. Oosterhuis, Dennis L. Coker, and Robert S. Brown 70

**Effect Of Application Rate Of Messenger™
On The Physiology and Yield Of Field-Grown Cotton**
Cassandra R. Meek and Derrick M. Oosterhuis 75

**Evaluation Of Messenger™ For Root-Knot Nematode
Suppression In Cotton**
*Terry L. Kirkpatrick, Joseph J. Paling, Ronnie J. Bateman,
Cassandra R. Meek, and Ned French* 79

**Morphometric Variation Of Reniform Nematode Geographic
Populations From Cotton-Growing Regions in the United States**
Paula Agudelo, Robert T. Robbins, and James M. Stewart 87

**Hybridization Of Exotic Germplasm With Upland Cotton As
The First Step In Transfer Of Reniform Nematode Resistance**
Nilesh Dighe, James M. Stewart, and Robert T. Robbins 92

Field Test Of A New Cotton Petiole Monitoring Technique
Derrick M. Oosterhuis, Dennis L. Coker, Robert S. Brown 96

**Response Of Dryland and Irrigated Cotton To
Potassium Fertilization**
Dennis L. Coker, Derrick M. Oosterhuis, and Robert S. Brown 103





**Field Evaluation Of Foliar-applied Fertilizers
On The Growth And Yield Of Cotton**

Dennis L. Coker, Derrick M. Oosterhuis, and Robert S. Brown 108

Evaluation Of Soil And Foliar Fertilization With Boron In Arkansas

*Derrick M. Oosterhuis, William C. Robertson, J. Scott McConnell,
Robert S. Brown, and Dennis L. Coker 117*

Varietal Responses Of Cotton To Nitrogen Fertilization

J. Scott McConnell, William H. Baker, and Robert C. Kirst, Jr. 121

**Long-term Irrigation Methods And Nitrogen Fertilization Rates
In Cotton Production: The Last Five Years**

J. Scott McConnell and Robert C. Kirst, Jr. 124

Nitrogen Fertilization Of Ultra-Narrow-Row Cotton

J. Scott McConnell, Robert C. Kirst, Jr., Robert E. Glover, and Ray Benson.. 129

Spatial Yield Analysis in Northeast Arkansas Fields

Sreekala G. Bajwa and Earl D. Vories 133

**Hand Removal Of Upper-Canopy Squares At NAWF=5 Plus
250, 350, or 450 Heat Units As A Model For Simulating
Insect Damage: How Are Yield And Quality Affected?**

Derrick M. Oosterhuis, Robert S. Brown and Dennis L. Coker 140

**Glyphosate And Pyriithiobac (Staple™) Combinations In Roundup
Ready™ Cotton**

Marilyn R. McClelland, James L. Barrentine, and Oscar C. Sparks 147

Biology And Control Of Yellow Nutsedge In Cotton

Frank E. Groves and Kenneth L. Smith 153

**Evaluation Of Trifloxysulfuron™ And Pyriithiobac™ In
Transgenic Cotton Weed Control Programs**

Jeffrey W. Branson, Kenneth L. Smith, and Robin C. Namenek 156





Alteration Of Cotton Plant Stress Dynamic By Tarnished Plant Bug Feeding

Chuck Yates and N. Philip Tugwell 159

Mortality Of Tarnished Plant Bug Adults Following Differential Exposure To Centric, Steward, And Leverage In Field Cages

Tina G. Teague, N. Philip Tugwell, and Eric J. Villavaso 161

Late-Season Tarnished Plant Bug Infestations: When Is The Crop Safe?

Tina G. Teague, N. Philip Tugwell, and Eric J. Villavaso 164

Effects Of Aphid Feeding On Foliar Antioxidant Enzymes In Cotton

S. Karen Gomez, Derrick M. Oosterhuis, Satyendra N. Rajguru, and Donald R. Johnson 178

Inclusion Of Beneficial Insects Into The Cotton Aphid Treatment Threshold

Hugh E. Conway, Donald C. Steinkraus, and Timothy J. Kring 182

Efficacy Of Emerging And Existing Insecticides For Control Of Aphids And Whiteflies In Southeast Arkansas Cotton

Jeremy K. Greene and Chuck Capps 189

Efficacy Of New And Standard Insecticides For Control Of The Heliothine Complex In Southeast Arkansas Cotton

Jeremy K. Greene and Chuck Capps 193

Evaluation Of Insecticide Termination Decisions In Southeast Arkansas

Jeremy K. Greene, Chuck Capps, William C. Robertson, and Steve Kelly 198

Laboratory Evaluations Of Cotton Insecticides For Control Of Stink Bugs

Jeremy K. Greene and Chuck Capps 202

Duration Of Feeding By Tarnished Plant Bug On Small Bolls And Impact On Yield And Fiber Quality

Jeremy K. Greene and Chuck Capps 210





Evaluation Of Thrips Control Options In Southeast Arkansas Cotton

Jeremy K. Greene and Chuck Capps 213

Thrips Management In Arkansas Cotton

John D. Hopkins, Jack D. Reaper, III, Donald R. Johnson, and Gus M. Lorenz, III 216

Evaluation Of Cotton Varieties For Thrips Resistance

Donald R. Johnson, Jack D. Reaper, III, John D. Hopkins, and Gus M. Lorenz, III 224

Heliothine Control In Bt And Non-Bt Cotton With The Advent Of Boll Weevil Eradication

Donald R. Johnson, Jack D. Reaper, III, John D. Hopkins, and Gus M. Lorenz, III 230

Efficacy Of New And Standard Chemistry For Heliothine Control In Cotton

Jack D. Reaper, III, John D. Hopkins, Donald R. Johnson, and Gus M. Lorenz, III 236

Efficacy Of Heliothine Control Materials In Bt And Non-Bt Cotton

John D. Hopkins, Donald R. Johnson, Gus M. Lorenz, III, and Jack D. Reaper, III 242

Efficacy Of Asana XL™ Tank Mixed With New Chemistry For Heliothine Control In Cotton

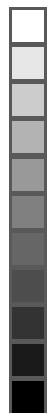
Jack D. Reaper, III, John D. Hopkins, Donald R. Johnson, and Gus M. Lorenz, III 248

Cotton Response to Pre-Square Terminal Injury From Various Sizes of Tarnished Plant Bug Nymphs

Steven Coy, Tina G. Teague, N. Philip Tugwell, and Eric J. Villavaso 253

Sublethal Effects of New Insecticides on Insidious Flower Bug

Glenn E. Stuebaker and Timothy J. Kring 259





Discovery and Isolation of a Bacterial Chitosanase Gene With Potential For Genetically Engineered Fungal Resistance

Bill Hendrix, Jasan Hammack, and James M. Stewart 264

STS Markers Co-Segregate With Cotton Cytoplasmic Male Sterility Restorer Gene RF1

Chunda Feng, Jinfa Zhang, and James M. Stewart..... 267

Economic Analysis Of Ultra-Narrow-Row Cotton

Kelly J. Bryant, Claude Kennedy, Jimmy Hornbeck, and Rodrick Robinson 272

Characteristics of Cotton Rental Arrangements in Arkansas: Survey Results

Joao E. Mutondo, Lucas D. Parsch, Bruce L. Dixon, Bruce L. Ahrendsen, and Ralph W. Bierlen 277

2001 Cotton Research Verification Program Demonstrations

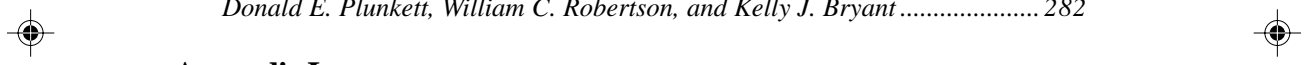
Donald E. Plunkett, William C. Robertson, and Kelly J. Bryant 282

Appendix I

Student Theses and Dissertations Related to Cotton in Progress in 2001 288

Appendix II

Research and Extension 2001 Cotton Publications 290





PREFACE

The 2001 cropping season was by comparison with previous years a very good year as far as yields went, but extremely disappointing with regard to cotton prices. The relatively mild temperatures and good rainfall experienced during the boll development period (Fig. 1) resulted in an average state yield of 823 lb lint/acre from 1,065,500 acres harvested, for a total production of 1,825,000 bales. The season average price was \$0.33/lb for a production value of \$428,541,000. It is interesting that the total production in 2001 represents the most bales produced in Arkansas since 1948 when 2,375,000 acres were planted, although the season average price in 1948 was only \$0.03 lower! By the end of July the cotton crop in Arkansas showed promise of an exceptionally high yield. However, some deterioration of the crop occurred due to an excessively wet period in late August resulting in boll rot, some sprouting of seed in the boll in southeast Arkansas, and lower yields. The boll weevil eradication program appears to be working successfully, although the boll weevil is not going down without a fight. The 2001 season experienced higher populations of tarnished plant bugs than normal.

Cotton yields in Arkansas increased steadily during the eighties, but in recent years there has been a leveling off. Of more significance, however, is that extreme year-to-year variability in yields has occurred in the last decade, which is a major point of concern with cotton producers. It has been suggested that this may be related to extreme weather conditions during the boll development period in July and August. Average maximum temperatures in the 2001 season were a few degrees above normal. Recent research in Arkansas has indicated that elevated night temperatures during boll development may be a major contributory factor to low and variable yields. There is also evidence that yield variability in stressful seasons may be related to genotypic changes in the components of yield, seed number, and fiber per seed, over the last 30 years. Yield stability for Arkansas cotton producers has become a major focus for new in-state collaborative research projects.



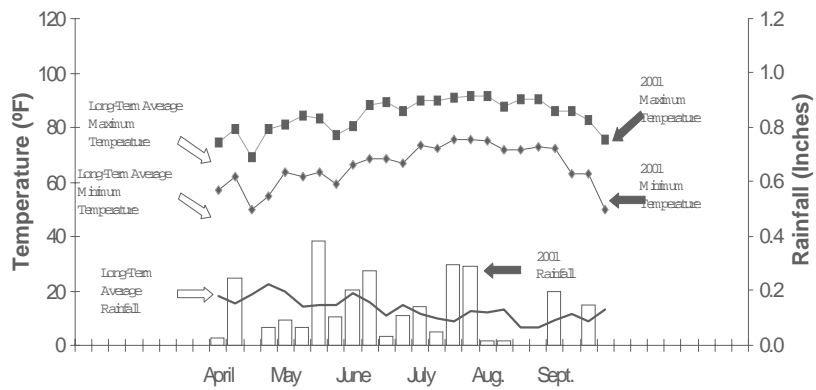


Fig. 1. Weekly maximum and minimum temperatures and rainfall for 2001 compared with the long-term 31-year averages at West Memphis, Arkansas.



ARKANSAS COTTON RESEARCH GROUP


2001/2002

The University of Arkansas Cotton Group is composed of a steering committee and three sub-committees representing production, genetics, and pest management. The group contains the appropriate representatives in all the major disciplines as well as representatives from the Cooperative Extension Service, the Farm Bureau, the Agricultural Council of Arkansas, and the State Cotton Support Committee.


The objective of the Arkansas Cotton Group is to coordinate efforts to improve cotton production and keep Arkansas producers abreast of all new developments in research.

Steering Committee: Fred Bourland, Gus Lorenz, Gene Martin, Keith Martin, Robert McGinnis, Derrick Oosterhuis (Chm.), Don Plunkett, Bill Robertson, Craig Rothrock, Mac Stewart, Cecil Williams, David Wildy, Jerry Williams

Pest Management: Jeremy Greene, Don Johnson, Terry Kirkpatrick, Tim Kring, Gus Lorenz, Bill Robertson, Craig Rothrock (Chm.), Ken Smith, Don Steinkraus, Glen Studebaker, Tina Teague, Chris Tingle, Phil Tugwell, Seth Young



Production: Morteza Mozaffari, Leo Espinoza, Mark Cochran, Dennis Gardisser, Gus Lorenz, Scott McConnell, Derrick Oosterhuis (Chm.), Lucas Parsch, Don Plunkett, Bill Robertson, Phil Tacker, Chris Tingle, Earl Vories



Genetics: Fred Bourland, Hal Lewis, Bill Robertson, Mac Stewart (Chm.)

ACKNOWLEDGMENTS

The organizing committee would like to express its appreciation to Marci Milus for help in typing this special report and getting it ready for publication.



COTTON INCORPORATED AND THE ARKANSAS STATE SUPPORT COMMITTEE

The Summaries of Cotton Research in Progress in 2001 has been published with funds supplied by the Arkansas State Support Committee through Cotton Incorporated.

The principal purpose of Cotton Incorporated is to increase the profitability of cotton production by building demand for U.S. cotton. The Arkansas State Support Committee of Cotton Incorporated is a board whose voting members are cotton growers from Arkansas. Advisory members include representatives of Arkansas' certified producer organizations, the University of Arkansas, the Cotton Board, and Cotton Incorporated. Five percent of Cotton Incorporated's total budget is allocated for research and promotional activities, as determined by the State Support Committees of the cotton-producing states. The sum allotted to Arkansas' State Support Committee is proportional to Arkansas' contribution to the total U.S. cotton fiber production and value in the five years previous to the budget.

The Cotton Research and Promotion Act is a federal marketing law. The objective of the act is to develop a program for building demand and markets for U.S. cotton. The Cotton Board, based in Memphis, Tennessee, was created to administer the act and is empowered to contract with an organization with the capacity to develop such a program. Cotton Incorporated, with its main offices in New York, New York, the center of the U.S. clothing merchandising industry, and its research offices in Raleigh, North Carolina, the center of the U.S. textile industry, is the contracting agency. Cotton Incorporated also maintains offices in Osaka, Japan; Mexico City, Mexico; Shanghai, China; and Singapore, Malaysia to foster international sales. Both the Cotton Board and Cotton Incorporated are non-profit entities with governing boards comprised of cotton growers and cotton importers. The budgets of both organizations are annually reviewed and approved by the U.S. Secretary of Agriculture.

Cotton production research is supported in Arkansas both by Cotton Incorporated directly from its national budget and by the Arkansas State Support Committee from its formula funds. Several of the projects described in this research summaries publication, including publication costs, are supported wholly or in part by these means.

Arkansas Cotton State Support Committee / Cotton Incorporated funding 2001.

Project	Principal investigator	Amount funded	
		2001	2002
Proceedings annual Arkansas research meeting	Oosterhuis	5,000	6,500
Cottonseed pool — Arkansas	Cotton Inc.	8,520	5,520
Control of reniform nematodes	Kirkpatrick	19,118	19,118
Cotton graduate student award	Oosterhuis	500	--
New stress index	Tugwell	10,000	10,000
New petiole sampling	Oosterhuis	6,370	6,370
Plant bug feeding	Greene	8,000	8,000
Transgenic evaluation	Tingle	15,000	15,000
Insecticide termination	Greene	10,000	10,000
Bollworm/budworm studies	Johnson	13,934	13,934
Carbohydrate partitioning and stress	Oosterhuis	18,650	18,650
Defoliation	Robertson	9,486	9,486
Fungicide decisions	Rothrock	13,946	13,946
Aphid fungus	Steinkraus	15,927	15,927
New irrigation	Vories	23,188	23,188
Herbicide systems	Savage	16,000	16,000
Mapping PGRs	Robertson	15,304	15,304
Sidedress Temik	Lorenz	11,990	11,990
Herbicide drift	Robertson	12,091	12,091
Smaller bracts	Bourland	15,227	15,228 *
Plant breeding: yield and quality	Bourland	25,935	25,935
Campaign for Agriculture	Welch	--	1,000
Stink bug thresholds	Greene	--	15,500
Large-scale variety evaluations	Guy	--	10,000
Aphid thresholds	Kring	--	5,541
Totals:		274,186	304,228

* this amount was carried over from 2001.



**SUMMARIES OF
ARKANSAS COTTON RESEARCH
2001**

