PROCEEDINGS OF THE 2000 COTTON RESEARCH MEETING

AND

SUMMARIES OF COTTON RESEARCH IN PROGRESS

Edited by Derrick M. Oosterhuis

Arkansas Agricultural Experiment Station
Fayetteville, Arkansas 72701

CONTRIBUTORS

Allen, Charles T., Extension Entomologist, Arkansas Cooperative Extension Service, Southeast District, Monticello

Baker, William H., Research Assistant Agronomist, Soil Test Laboratory, Marianna

Barrentine, James L., Professor and Head, Department of Crop, Soil, and Environmental Sciences, Fayetteville

Benson, N. Ray, Assistant Specialist - Agronomy, Cooperative Extension Service, Little Rock

Bourland, Fred M., Director, Northeast Research and Extension Center, Keiser

Brown, Robert S., Graduate Assistant, Department of Crop, Soil, and Environmental Sciences, Fayetteville

Bryant, Kelly J., Area Extension Specialist, Southeast Research and Extension Center, Monticello

Burgos, Nilda R., Assistant Professor, Department of Crop, Soil, and Environmental Sciences, Fayetteville

Capps, Charles, Research Specialist, Southeast Branch Experiment Station, Rohwer

Cochran, Mark J., Professor and Head, Department of Agricultural Economics and Agribusiness, Fayetteville

Coker, Dennis L., Graduate Assistant, Department of Crop, Soil, and Environmental Sciences, Fayetteville

Coyle, Gwen, Research Specialist, Department of Crop, Soil, and Environmental Sciences, Fayetteville

Crow, Mitch, Monroe County Extension Agent, Cooperative Extension Service, Clarendon

Danforth, Diana M., Research Associate, Department of Agricultural Economics and Agribusiness, Fayetteville

Earnest, Larry D., Superintendent, Southeast Branch Experiment Station, Rohwer

Edmund, Richard, Technical Representative, DuPont Agricultural Products, Little Rock

Fisher, April, Jefferson County Extension Agent - Agriculture, Cooperative Extension Service, Pine Bluff

Glover, Robert E., Research Specialist, Northeast Research and Extension Center, Keiser

Gomez, S. Karen, Graduate Assistant, Department of Crop, Soil, and Environmental Sciences, Fayetteville

Hopkins, John D., Assistant Specialist, Cooperative Extension Service, Lonoke

Johnson, Donald R., Extension Entomologist, Cooperative Extension Service, Little Rock

Kelley, Steve R., Desha County Extension Agent, Cooperative Extension Service, McGehee

Kharboutli, Marwan S., Extension Associate (Pest Management), Southeast Research and Extension Center, Monticello

Kirkpatrick, Terry L., Professor, Southwest Research and Extension Center, Hope
Kirst, Robert C., Jr., Research Specialist, Southeast Research and Extension Center, Monticello
Krieg, Doug, Professor of Crop Physiology, Texas Tech University, Lubbock, Texas
Kring, Timothy J., Professor, Department of Entomology, Fayetteville
Ladner, Doug, BWE Foundation, Little Rock Arkansas.
Lorenz, Gus M., IPM Coordinator, Cooperative Extension Service, Little Rock
Malo, Juan P., Graduate Student, Department of Agricultural Economics and Agribusiness, Fayetteville
McClelland, Marilyn R., Research Associate, Department of Crop, Soil, and Environmental Sciences, Fayetteville
McConnell, James S., Agronomist, Southeast Research and Extension Center, Monticello
Meek, Cassandra R., Graduate Assistant, Department of Crop, Soil, and Environmental Sciences, Fayetteville
Mobley, Michelle L., Graduate Assistant, Department of Crop, Soil, and Environmental Sciences, Fayetteville
Norton, Chad, Lincoln County Extension Agent, Cooperative Extension Service, Star City
Oosterhuis, Derrick M., Distinguished Professor - Crop Physiology, Department of Crop, Soil, and Environmental Sciences, Fayetteville
Ow, David W., Plant Gene Expression Center, USDA-ARS, Albany, California
Page, Larry M., Pest Management Associate, Cooperative Extension Service, Lonoke
Parsch, Lucas D., Associate Professor, Department of Agricultural Economics and Agribusiness, Fayetteville
Plunkett, Donald E., Cotton Research Verification Coordinator, Southeast Research and Extension Center, Monticello
Rajguru, Satyendra, Graduate Assistant, Department of Crop, Soil, and Environmental Sciences, Fayetteville
Robbins, Robert T., Professor, Department of Plant Pathology, Fayetteville
Robertson, William C., Extension Agronomist - Cotton, Cooperative Extension Service, Little Rock
Rothrock, Craig S., Professor, Department of Plant Pathology, Fayetteville
Shult, Milo J., Vice-President for Agriculture, University of Arkansas Division of Agriculture, Little Rock
Sites, Jerry W., Drew County Extension Agent, Cooperative Extension Service, Monticello
Smith, Greg L., Consultant, Buffalo Island Crop Service, Leachville
Smith, Kenneth L., Extension Weed Scientist, Southeast Research and Extension Center, Monticello
Stewart, James McD., Professor, Department of Crop, Soil, and Environmental Sciences, Fayetteville

Studebaker, Glenn E., Extension Entomologist, Northeast Research and Extension Center, Keiser
Teague, Tina G., Associate Professor, Arkansas State University, Jonesboro
Tugwell, N. Philip, Professor of Entomology, Department of Entomology, Fayetteville
Turley, Rick B., Plant Physiologist, USDA-ARS, Crop Genetics and Production Laboratory, Stoneville, Mississippi
Vories, Earl D., Associate Professor, Department of Biological and Agricultural Engineering, Northeast Research and Extension Center, Keiser
Walker, Nathan R., Assistant Professor, Oklahoma State University, Stillwater
Watson, Rebecca, Desha County Extension Agent, Cooperative Extension Service, McGehee
Zhang, Jinfa, Graduate Assistant, Department of Crop, Soil, and Environmental Sciences, Fayetteville
Zhao, Duli, Research Associate, Department of Crop, Soil, and Environmental Sciences, Fayetteville
Zhao, Qian, Graduate Student, Department of Crop, Soil, and Environmental Sciences, Fayetteville

CONTENTS

2000 SUMMARIES OF COTTON RESEARCH IN PROGRESS

PREFACE

The 1999 cropping season was one of the most stressful and disappointing in recent history. The extremely hot, dry weather experienced during the boll development period resulted in an average state yield of 715 lb lint per acre from 970,000 acres. Lint quality was also a little disappointing with trends toward short fiber and high micronaire. However, insect pressures were not as high as expected.

The season began with good crop development up to flowering, and producers were optimistic for high yields. However, extremely hot, dry conditions during July and early August (see Fig.1) affected boll growth, particularly seed and fiber development, so that low yields resulted despite good management efforts. Irrigation only partially offset the extreme heat and excessively dry conditions. Although cotton originates from hot climates, it does not grow best at excessively high temperatures. Reports in Arkansas indicate that across years high average temperatures are associated with low yield and low temperatures with high yields. The ideal temperature range for cotton is reported to be from 68 to 86°F. However, from a physiological point of view, the ideal temperature range for cotton for optimal metabolic activity is 74-90°F with the optimum for photosynthesis at 82°F. Average daily maximum temperatures in July and August in the Mississippi Delta *are usually above 90°F*, i.e. above the optimum for photosynthesis.

There are no obvious immediate remedies to the problems associated with high temperature. Suggestions include genetic selection for cultivars more tolerant to high temperatures during boll development. Crop management should focus on producing an early crop (e.g. effective and timely insect and weed control, attention to water availability, and judicious fertility) by using an effective crop monitoring system, i.e. COTMAN. Plant growth regulators should be used to enhance early fruit set and early maturity. However, in spite of best management efforts, the occurrence of untimely severe weather, coupled with insect attacks, can still adversely affect cotton growth and yield.

Cotton yields in Arkansas increased steadily during the eighties, but in recent years there has been a leveling off and possibly even a decrease in yield. Of more significance, however, is that the last five years have provided extreme year-to-year variability in yields which is a major point of concern with cotton producers. Yield stability for Arkansas cotton producers has become a major focus for new in-state collaborative research projects.

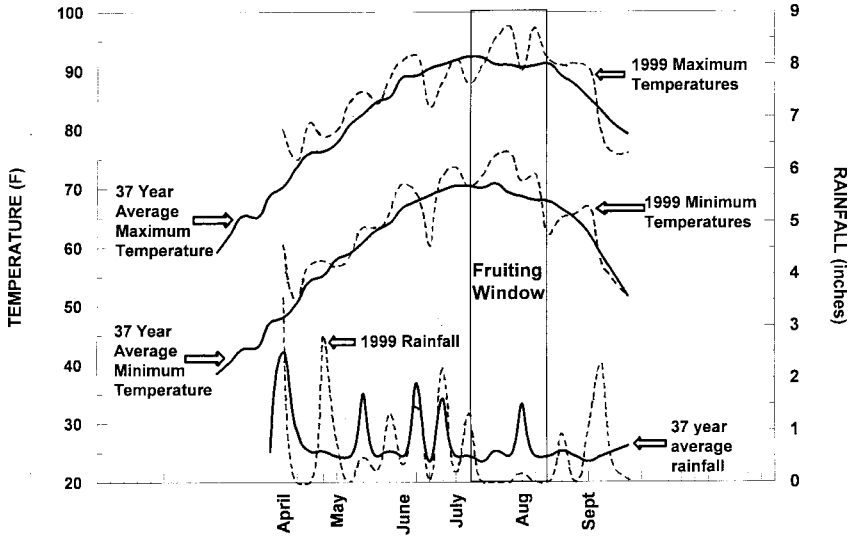

Figure. 1. Weekly maximum and minimum temperatures and rainfall for 1999 compared with 37-year averages at Rohwer, Southeast Arkansas.

ARKANSAS COTTON RESEARCH GROUP
1999/2000

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: Charles Allen, Gary Felton, Don Johnson, Terry Kirkpatrick, Tim Kring, Gus Lorenz, Bill Robertson, Craig Rothrock (Chm.), Ken Smith, Don Steinkraus, Glen Studebaker, Tina Teague, Phil Tugwell, Seth Young

Production: Bill Baker, Ray Benson, Mark Cochran, Dennis Gardisser, Terry Keisling, Gus Lorenz, Scott McConnell, Derrick Oosterhuis (Chm.), Lucas Parsch, Don Plunkett, Bill Robertson, Cal Shumway, Phil Tacker, Earl Vories

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

ACKNOWLEDGMENTS

The organizing committee would like to express its appreciation to all those individuals who helped with the arrangements for the 2000 Arkansas Cotton Research Meeting, particularly Jerry Williams and Bill Robertson; and the companies who sponsored the Continental Breakfast and coffee breaks: Monsanto and DuPont. We also extend our gratitude to Marci Milus for help in typing this Special Report and getting it ready for production.

COTTON INCORPORATED AND THE ARKANSAS STATE SUPPORT COMMITTEE

The 2000 Proceedings of the Arkansas Cotton Research Meeting has been published with funds supplied by the Arkansas State Support Committee of 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 promotion 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 cotton. The Cotton Board, based in Memphis, Tennessee, was created to administer the act and empowered to contract with an organization with the capacity to develop such a program. Cotton Incorporated, with its world headquarters and research center in Cary, North Carolina, is the contracting agency. Cotton Incorporated also maintains offices in Basel, Switzerland; Osaka, Japan; Mexico City, Mexico; Shanghai, China; and Singapore 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 these proceedings, including the publication of these Proceedings, are supported wholly or in part by these means.

Arkansas Cotton State Support Committee / Cotton Incorporated Funding 1996-2000.

Project	Principal Investigator	Amount Funded ($) 1996	1997	1998	1999	2000
Manipulation of the effective fruiting window	Bourland	24,550	----	----	----	
Proceedings annual Arkansas research meeting	Oosterhuis	6,000	6,000	5,000	5,000	5,000
Cottonseed pool — Arkansas	Cotton Inc.	11,000	10,000	14,200	14,200	13,700
Conditions for successful use of foliar nitrogen	Baker	21,400	21,400	----	----	----
Weed control in conservation tillage	McClelland	7,000	7,000	----	----	----
Early irrigation management	McConnell	19,500	19,500	----	----	----
Petiole monitoring sampling evaluation	Oosterhuis	8,100	8,100	----	----	----
Management of early season pest damage	Rothrock	22,000	22,000	----	----	----
Support of boll weevil eradication in Arkansas	Alexander	15,000	15,000	10,000	10,000	----
Boll weevil eradication: implementation and evaluation	Yearian	123,450	123,450	89,800	89,800	85,656
Research on the cotton aphid fungus	Steinkraus	8,000	11,000	13,800	----	----
Integration of weed control programs	Baldwin	10,000	10,000	10,000	----	----
Terminating squares after physiological cutout	Bourland	----	----	3,500	3,500	3,500
Control of reniform nematodes	Kirkpatrick	----	----	16,300	16,300	16,300
COTMAN: Economics	Cochran	----	----	16,000	16,000	16,000
Validation of COTMAN termination	Allen	----	----	10,000	10,000	10,000
Plant growth regulator evaluation	Oosterhuis	----	----	16,000	16,000	16,000
Breeding and evaluation of host plant resistance	Bourland	----	----	20,000	20,000	20,000
Control of spider mite	Steinkraus	----	----	13,700	13,700	13,700
Boll weevil overwintering sites	Johnson	----	----	30,200	30,200	30,200
Roundup Ready and Bt evaluation	Allen	----	----	15,000	15,000	15,000
Cotton graduate student award	Oosterhuis	----	----	500	500	5000
Natural enemies	Kring	----	----	----	6,800	9,430
New Stress Index	Tugwell	----	----	----	----	10,000
Root Problem Handbook	Oosterhuis	----	----	----	----	2,000
New Petiole Sampling	Oosterhuis	----	----	----	----	6,370
Plant Bug Feeding	Allen	----	----	----	----	8,000
Totals:		276,000	278,000	283,500	267,000	281,356

PROCEEDINGS OF THE 2000 COTTON RESEARCH MEETING

Arkansas Cotton Research/Extension/Production and Marketing Group
University of Arkansas

Theme: Research for Efficient and Profitable Cotton Production

Proceedings of a Conference held at the
Phillips County Community College, Helena
February 15, 2000