Challenging the Past to Build the Future

Conference Proceedings

Greensboro, North Carolina

March 21-24, 1993

Coordinated by:

SCHOOL OF AGRICULTURE
NORTH CAROLINA A&T STATE UNIVERSITY
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Challenging the Past to Build the Future

March 21-24, 1993
Greensboro, North Carolina

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SUNDAY, MARCH 21, 1993

1:00 - 1:30 PM ........................................ Registration

1:30 - 2:30 PM ........................................ General Session

Moderator ........................................ M. Ray McKinnie
Animal Science Specialist
NC A&T Agricultural Research and Cooperative Extension

Welcome .............................................. Charles Williams
Associate Vice Chancellor for
Academic Affairs, NC A&T

Statement of Purpose .......................... D. D. Godfrey,
Associate Dean & Administrator, NC A&T Cooperative Extension

2:45 - 3:45 PM ........................................ Sustainable Agriculture
Issues on the National Agenda

Presenter ...................................... George Bird, Director
USDA Office of Sustainable Agriculture

3:45 - 4:00 PM ........................................ Break

4:00 - 4:45 PM ........................................ Rodale Research Institute—
A Connection for Sustainable Agriculture

Presenter ........................................ Rhonda Janke
Director of Research
Domestic Programs, Rodale Research Institute

4:45 - 5:30 PM ........................................ The Challenges Ahead for Agriculture:
Small-Scale Producers' Perspective

Presenters ..................................... James T. Shackleford Jr.
Snow Hill, NC
........................................... Alex Hitt
Graham, NC

MONDAY, MARCH 22, 1993

8:30 - 10:30 AM ........................................ 1890 Research Efforts in Sustainable Agriculture and Alternative Enterprises

Moderator ........................................ John O’Sullivan,
Farm Management & Marketing Specialist, NC A&T Cooperative Extension

The 1890’s Horticulture and Agronomy Research
.............. Dyremple Marsh, Agricultural Research,
Lincoln University

The 1890’s Animal Science Research
.............. M. Ray McKinnie, Agricultural Research,
NC A&T University

The 1890’s Aquaculture Research
............... Scott Newton, Agricultural Research,
Virginia State University

10:30 - 10:45 AM ........................................ Break

10:45 - 11:45 AM ........................................ Telecommunications Technology

Presenters ...................................... Fields Gunsett
Animal Science Dept., NC A&T
........................................... Valerie McAlpin
Agricultural Communications Director, NC A&T

11:45 - 1:15 PM ........................................ Lunch

1:15 - 3:15 PM ........................................ 1890 Outreach and Extension Efforts in Sustainable Agriculture and Alternative Enterprises

Moderator ........................................ Marihelen Glass
Plant Science Dept., NC A&T

Ways to Grow
.............. M. Ray McKinnie
NC A&T Extension
Community Voices
Shirley Calloway, NC A&T Extension
The Randolph Demonstration Farm
Mitchell Patterson, Farm Superintendent and Extension Specialist, VA State University

3:15 - 3:30 PM ................................................. Break

3:30 - 5:00 PM .............................................
Interdisciplinary Approaches for Sustainable and Alternative Agriculture

In breakout sessions, the objectives will be: (I) A Vision of an Achievable Goal; (II) Ways of Overcoming Barriers; (III) Ways of Working Together

6:30 PM ................................................. Banquet

The Challenge of Change is Making Choices: Opportunities for Sustainable Agriculture in the New Administration

Guest Speaker ............................................. Terry Nipp
Aesop Enterprises Ltd

Tuesday, March 23, 1993

10:00 AM - 5:00 PM ...........................................
Tour of North Carolina State University Sustainable Agriculture Project (Raleigh)

Conference participants are asked to spend some time Tuesday evening preparing final group reports for Wednesday morning.

Wednesday, March 24, 1993

Moderator ............................... Dr. Robert Williamson
Natural Resources Specialist
NC A&T Cooperative Extension

8:30 - 9:30 AM .............................................
Potential for Interdisciplinary Approaches for Sustainable and Alternative Agriculture

Group reports.

9:30 - 9:45 AM .............................................
The Challenge to Put It All Together

Presenter ............................................. Charles Panton
Associate Dean for Research
NC A&T School of Agriculture

10:15 - 11:15 AM ...........................................
Sustainable Agriculture and Rural Development

Presenter ............................................. Andrea Harris, Director
NC Institute of Minority Economic Development
Welcome

Charles Williams
Associate Vice Chancellor for Academic Affairs
North Carolina A&T State University

On behalf of the Chancellor, Dr. Edward Fort, the faculty, staff and students of North Carolina Agricultural & Technical State University, let me welcome you to our campus, our city and this conference. Thank you for giving me the opportunity of seeing all of you here at our campus, ready to grapple with a topic as important as the one you have before you. It gives us all honor to know that you are here in our midst, ready to confront the issues of today and bring to bear the expertise and resources of the entire 1890 community.

North Carolina A&T, (like all of our sister 1890 institutions and Tuskegee University), has been involved in the business of bringing together, from an educational point of view, rural families of our state — especially the minority and socially disadvantaged peoples of NC — and information on the ways they can make the best of their situations for over 100 years. For certain, the situations in which people find themselves — their opportunities and challenges — have changed much in the past, and will continue to change much in the future. The challenge to ourselves, however, is the same: to be relevant in helping to define the challenges, to state the vision and to identify the steps to take to achieve the objects.

Since the mid 1980s, the A&T faculty has been actively involved in the southern regional sustainable agriculture endeavors; earlier called LISA (Low Input Sustainable Agriculture), more recently SARE (Sustainable Agriculture Research and Extension) programs funded by USDA. They have served on technical committees, review committees and other work teams; for example, participation in the planning of the recent meeting in Calloway Gardens in Georgia to discuss agendas on sustainable agriculture for the southern region. They submitted a LISA proposal (in cooperation with Tennessee State and Virginia State) for a planning grant which was funded in 1987. They have carried the concepts of sustainability into the international forum in cooperation with other universities while working with the Agency for International Development, and the Office of International Cooperation and Development. Within the state of North Carolina, they have been working with North Carolina State University and such groups as the Carolina Farm Stewardship Association to bring awareness to the complexity of agricultural production and marketing within ecological systems which must be preserved and maintained for future generations to the attention of the land-grant university community and to the audiences we are especially charged to work with.

With well over 98 percent of the population of the United States not involved in production agriculture and even, quite frankly, not knowledgeable about where their food is coming from; with the environmental and economic costs of monoculture, high chemical use in extensive production, with waste disposal from very intensive livestock operations facing many counties across the south; with the decline and near extinction of minority farming; and the increasingly complex and sophisticated answers being offered for increasingly complex questions; the challenge is here before us as it was before: to
be relevant in helping to define the challenges, to
state the vision and to identify the steps to take to
achieve the objects.

Thus, for minority and all small-scale
farmers and landowners, for rural communities
involved in the world economy, for future
generations; let us resolve to bring all of our
expertise together in a multi-disciplinary, multi-
institution fashion across state lines and through-
out the whole region. Let us listen to each other
and hear of the expertise we have developed
while laboring, each in our own field. Let us learn
from others and build a team so that our educa-
tional audiences can become active players in the
discussion of sustainability, so that each small
farm in the South can become a research station in
its own creative right, and so that we better
understand our role as human beings in the
complex web of systems surrounding us — for
the betterment of our fair state, region and
country.

The challenges are vast but not insurmount-
able. The vision is great and most complex. Yet
the steps to be taken are here for you to identify.
Good luck and have a great conference.
Statement of Purpose

D.D. Godfrey
Associate Dean
North Carolina A&T State University School of Agriculture

I am very happy to see so many representatives of the extension and research components of the 1890 Land-Grant community here this afternoon, and I wish to thank the Southern Rural Development Center for their willingness to assist us with this conference. We have worked long, hard hours to develop this program, and we hope that it leads to the desired outcome: a much more visible and effective 1890 Land-Grant participation in the discussion about and implementation of agricultural and rural policy research and educational outreach in the United States at the turn of the twenty-first century.

We have been serious about sustainable agriculture for our communities since 1891 and we expect to see small, and minority owned farms as part of the agricultural and rural scene for the next century. We want to be out there working with them in terms of our mandates in research and education to help them sustain their farms and communities for generations upon generations!

The purpose of this program from today through Wednesday is very simple. It is to build bridges — among ourselves and with other players in the arena of agricultural and rural community research and extension in the southeastern region of the United States. From this cooperative endeavor we hope to derive a better understanding of our own "Centers of Excellence" at 1890s. We also hope to reach agreement on ways to network among ourselves as researchers and extension educators, and with others like our colleagues at the Rodale Institute who, under the sorely missed inspirational leadership of Bob Rodale, have been pioneers in this area for many, many years. Multi-disciplinary approaches are needed to address sustainable and alternative enterprise issues for the 1890 outreach target audience.

This is a conference with preconceived outcomes. We hope and are confident to see on Wednesday: 1) SARE (Sustainable Agriculture Research and Education) ready ideas and networks in place for the 1993 proposal cycle; 2) recommendations for the initiation of a connection with Rodale Research Institute for regional applied research cooperation; and 3) agreement on steps to implement a multi-disciplinary Farming Systems Research and Extension (FSR/E) approach which will promote sustainable agricultural practices in the southeastern United States.

Thank you for your willingness to be here and to be part of this program building toward the future. Our past challenges us. Our present is only a stepping stone to that new future!
Sustainable Agriculture Issues on the National Agenda

G. W. Bird
Director
Sustainable Agriculture Research and Education Program, USDA

United States Agriculture has been very productive during the past 50 years. A number of unexpected consequences, however, are believed to be detrimental to the long-term interest of our nation’s agriculture and natural resources. In response to this concern, the United States Congress has mandated an alternative agricultural research and education program.

Program Overview

The Sustainable Agriculture Research and Education program (SARE) was initiated in 1988 and became known as the Low Input Sustainable Agriculture program (LISA). SARE is authorized under Subtitle B of Title XVI of the Food, Agriculture, Conservation and Trade Act of 1990 (FACTA). The program is currently funded at $6.725 million annually, and is managed through four regional administrative councils composed of farmers and ranchers, and representatives of non-profit private, agribusiness, government and academic organizations. SARE funds research and education projects designed to contribute to the goals of the definition of sustainable agriculture as defined in Section 1603 of FACTA. Most of the funded projects have meaningful involvement of farmers or ranchers. Sustainable agriculture teams are used to conduct site visits to review of progress of funded projects, and evaluate them for continued funding. In 1992, GAO conducted an audit of SARE and other USDA programs related to sustainable agriculture. The results of the audit were released at a Senate Committee on Agriculture, Nutrition and Forestry Subcommittee on Agricultural Research and General Legislation Hearing on Sustainable Agriculture on September 17, 1992.

Coordination of Scientific Efforts

SARE efforts are coordinated by the four regional administrative councils with federal agency representation from ARS, CSRS, the Extension Service, SCS, EPA and USGS. Each council also has representation from SCES, SAES and state departments of agriculture. The councils appoint Regional Technical Committees to review proposals and conduct site reviews of funded projects. A major sustainable agriculture research conference is scheduled for 1993. One of the regions used 1992 resources to fund farmer-initiated research projects. The National Sustainable Agriculture Advisory Council (NSAAC) is in the process of being appointed. NSAAC is mandated in Section 1622 of FACTA, and will have 28 members as described in Department Regulation 1043-34. Fourteen of the members will be from the private sector, and 14 will represent federal and state agencies or academic institutions. USEPA and SARE annually contribute $1.0 million for a joint research and education initiative known as Agriculture in Concert with the Environment (ACE). The SARE economic assessment is managed through a cooperative agreement with ERS. During the past five years a number of private sector organizations known as Sustainable Agriculture Working Groups (SAWG) and sustainable agriculture coalitions have been formed for promotion of sustainable agriculture.

National Agenda

SARE is designed to provide both a research and education base for the future economic viability of agriculture in the United States. Special emphasis is placed on whole-farm systems research and economic impact assessment. Additional projects are funded in the areas of experimental component research and exploratory research. The economic assessment project with ERS consists of six regional microeconomic initiatives and one national macroeconomics effort. An integrated decision-support system (PLANETOR) was developed as a national initiative for assessment of on-farm economics in relation to sustainable agriculture.
The FACTA definition of sustainable agriculture mandates that farming practices, “enhance environmental quality and the natural resource base upon which the agriculture economy depends,” and, “make the most efficient use of non-renewable resources and integrate, where appropriate, natural biological cycles and controls.” The research and education projects funded by SARE have strong environmental quality components, and most place emphasis on the use of on-farm resources. SARE interacts with USDA initiatives in IPM, animal waste management, and water quality.

Human resource development is approached by SARE through national and regional initiatives on the quality of life for farmers and ranchers, members of rural communities, and society as a whole. A national task force has developed a program for increasing interaction among biophysical and social scientists. The program is being offered for the first time during the winter of 1993. NSAAC membership will include farm family, human nutrition and food safety representation.

Scientific Issues and Opportunities

The most difficult scientific issues facing SARE include: whole-farm system research, environmental assessment research, regional and national economic impact research, and quality of life research. A whole-farm systems task force has nearly completed a protocol that will be available for use by the research community. The economic impact assessment and quality of life methodology issues are under the leadership of national task forces. Disciplines such as weed science, nematology and soil microbiology do not have adequate baseline resources to provide necessary contributions to sustainable agriculture; whereas, economics, entomology and plant pathology have enough critical mass to readjust to new research priorities.

SARE has identified a number of unique emerging issues that need to be evaluated. These include research on local value-added processes, on-farm participatory research, and implementation of the grassroots philosophy of sustainable agriculture.* It is becoming apparent that the research and education needs of the industrial agribusiness model farm, the family farm, and the part-time farm differ, and cannot be addressed through a single initiative.

Authorizing Legislation

The following Sections of FACTA mandate initiatives in sustainable agriculture:

- Section 1456 (Composting Research and Education)
- Section 1602 (Purpose of Title XVI)
- Section 1603 (Definition of Sustainable Agriculture)
- Section 1612 (National Center for Sustainable Agriculture Research and Training)
- Section 1615 (National Competitive Research Initiative)
- Section 1619 (SARE Purpose and Definitions)
- Section 1620 (Repeal of Agriculture Productivity Research)
- Section 1621 (Research and Extension Projects)
- Section 1622 (Program Administration)
- Section 1623 (Federal/State Matching Grant Program)
- Section 1624 (Authorizing Appropriations)
- Section 1627 (Integrated Management Systems)
- Section 1628 (Sustainable Agriculture Tactical Development and Transfer Program)
- Section 1629 (National Training Program)

There are authorized to be appropriated for each fiscal year $40 million, $20 million and $20 million for Chapter 1 (Sec. 1621-1624), Chapter 2 (Sec. 1627) and Chapter 3 (Sec. 1628-1629) of Subtitle B of Title XVI of FACTA of 1990, respectively.

Most Frequently Asked Questions

- Whatever happened to LISA? The name has changed, but the program and progress are

* There is a distinct need for private sector grassroots leadership to facilitate interaction among federal agencies, academia and agribusiness, in the interfacing of policy with science and technology. This must be done through a combination of farmer-agency participatory demonstration, and on-farm satellite initiatives. A pilot program should be started in 1993.
still going strong. That's right. What you once knew as LISA is now SARE, the Sustainable Agriculture Research and Education Program.

- **How many SARE pre-proposals were submitted from 1988-1991?** There were 1,376 pre-proposals requesting $145,145,253.
- **How many full proposals were received from 1988-1991?** SARE evaluated 1,059 proposals requesting $91,093,406.
- **How many regional projects were funded from 1988-1991?** SARE approved 164 regional projects for total funding of $17,704,000 (not including matching funds from other sources). This includes 21 projects funded in 1991 at $1,960,000 through the joint USDA-EPA Agriculture in Concert with the Environment Program (ACE).
- **Since sustainable agriculture research and demonstrations frequently require long-term efforts, how many projects have received continuation funding since 1988?** Some 56 projects have received continuation funding totaling $5,552,551.
- **How many national initiatives have been approved since 1988?** SARE has funded 31 national projects for total funding of $1,904,964.
- **What is the trend in quality of proposals?** The quality of proposals improves each year. Consequently, a growing number of potentially valuable projects are being rejected due to lack of funds.

### Challenging the Past to Build the Future

It is possible that the current sustainable agriculture movement is an early catalyst in a major societal transition from the "Industrial Growth Age" to a new era of "Sustainable Development." Such a transition would assure the health and well-being of the twenty-first century family farm model. This type of farm would be owner-operated, the family would usually live on the farm, it would be a diversified farm, it would place emphasis on the use of on-farm resources, the farm would have quality of life goals, and it would be designed to catalyze and support local value-added enterprises. These concepts are compatible with the basic features of sustainable systems, including system design, a rate of use of renewable resources that does not exceed the regenerative capacity of the system, a rate of use of non-renewable resources that does not exceed the rate of development of appropriate substitutes, and the production of system residuals that do not exceed the assimilation capacity of the system. The focal point of the 1890 Extension/Research Conference is designed to play an important role in translating these ideas into practical realities. It was indeed an honor to be able to participate in this conference on "Challenging the Past to Build the Future."

### Selected References


The Rodale Institute Research Center — A Connection for Regional and National Sustainable Agriculture

Rhonda R. Janke
Director of Research
Rodale Institute

Introduction

Rodale Institute was begun by J. I. Rodale in 1947 as the “Soil and Health Foundation.” It continues today as the Rodale Institute, and is a sister organization to Rodale Press, which was founded in 1937, and began publishing Organic Gardening and Farming in 1942. The Institute is a non-profit organization with 90 employees, and a $4.7 million budget. The Institute is funded through contributions from individuals, federal, state, and foundation grants and contracts, and profit centers such as The New Farm magazine and our visitor program and bookstore. Core support is received from the Rodale Press and the Rodale Family. The Institute has four divisions: Publishing, Finance, International, and the Research Center.

Land for the Research Center was purchased in 1972. It consists of a 330 acre Farm/Research Center in Berks County, Pennsylvania. We are located about 60 miles east of Harrisburg, and 60 miles north of Philadelphia. We conduct research on gardening, horticultural and fruit production systems, agronomy, soils, and cropping systems modeling. Three on-farm research networks supplement our on-station research. They are located in the Midwest (begun in 1984), the Mid-South (since 1988), and the Mid-Atlantic regions (since 1990) of the United States. Our international research projects are currently based in Senegal and Guatemala.

Once thought of as radical, Rodale is now considered a leader in sustainable agriculture. Rodale has played an important role in the passage of legislation and an appropriation for the federal USDA/SARE (Sustainable Agriculture Research and Education) program. USDA/ARS has had a full-time scientist at Rodale since 1984, and over 30 land-grant and USDA scientists have actively collaborated on projects conducted at the Research Center. Research results are published in several forms, including technical research reports, New Farm articles, and in refereed journal articles and book chapters.

How We Work

One area of strength is our long-term systems trials. A demonstration garden shows thousands of visitors each year how to grow food in their backyards without the use of chemical pesticides or fertilizers. The farming systems trial, begun in 1981, addressed problems faced by farmers going through the transition from conventional to organic farming. Today this trial serves as a model for other researchers. A systems approach combined with a robust statistical design makes this trial useful to weed scientists, soil scientists, and microbiologists who want to study properties inherent in conventional as compared to sustainable agriculture. Since 1985, the post transition phase, the yields in all cropping systems have been comparable, and economic analyses show that low-input farmers can achieve the same or better net income as their conventional neighbors.

We have a reality check in the form of three on-farm research networks. Farmers conduct research and demonstration trials on topics of interest which are related to sustainable agriculture and reducing inputs on their farms. Rodale’s role is one of a technical advisor or facilitator. The farmers conduct the research, and speak at field days and workshops, which are co-sponsored by Cooperative Extension, Rodale, and other non-profit groups. (Examples of projects underway in the mid-south network are listed in Table 1.) Farmers in the networks also provide feedback to researchers at Rodale and other cooperating organizations on the practicality of various cropping systems, and help to direct our research program in Pennsylvania.

Recently, we have begun research and other activities in the socio-economic realm, particularly looking at rural/urban linkages, barriers to
adoption of sustainable agriculture, and ways to set up new markets for farmers in urbanizing regions. These projects focus on our own region in southeastern Pennsylvania, but we hope to expand these models nationally in the future.

**Areas of Research**

The farming systems trial, described above, is our oldest long-term experiment. In 1987, we began a parallel trial to address sustainable agriculture for no-till and minimum-till farmers in a second, long-term, replicated systems trial. In the low-input reduced tillage experiment we have shown that reduced tillage and low-input methods are compatible, and farmers can cut energy use as well as purchased input use for field crops.

An orchard demonstration trial was begun in 1981 to study low-input apple production methods for small-scale growers. In 1988, this project was expanded and linked to other northeastern research groups through a LISA/SARE grant. The project now emphasizes second level IPM techniques for commercial growers, and is working towards an integrated, habitat management approach which includes flowering groundcovers and hedgerow species to attract and provide habitat for beneficial insects. A vegetable systems trial was begun in 1991 to address similar needs of commercial vegetable growers.

Compost production and utilization has become an area of increased emphasis in the past five years. Current experiments look for low-cost, low labor technologies for the production of compost on farms using a combination of farm manures and source-separated municipal yard waste, paper, and cafeteria waste. A long-term compost utilization trial is beginning in 1993 which will compare several composts for the production of food and feed crops.

The perennial cropping systems research program goal is to look far into the future, to develop new crops such as perennial grains for erodible cropland, and alley cropping with nitrogen fixing trees in combination with high value crops such as vegetables.

**Future Plans**

Our long-term cropping and gardening systems trials will continue as our core research program. These experiments provide "laboratories in the field" for Rodale scientists and collaborators who want to examine properties of sustainable cropping systems.

We are beginning work on a "soil health index" to quantify the changes that occur in the soil when practices like cover cropping and the use of soil amendments such as manures and composts are used. Currently soil measurements available to farmers focus on soil erosion and residue management. We would like to go further, and combine measurements such as water infiltration rate, aggregate stability, and microbial activity into an index that farmers can use to determine whether soil improvement has indeed occurred on their farms.

Rodale would like to establish itself as a leader in compost research, including compost utilization, testing of various composting practices for farmers, building rural/urban linkages to compost urban waste stream materials (yard waste, food waste and industrial by-products), and by helping to make compost regulations more farmer-friendly. We are currently developing a site to be used as a compost environmental monitoring study, to look at farm-scale windrow management and the containment and possible use of compost leachate on farms as a nutrient source.

**Current and Future Links to 1890 Land-Grants**

Our on-farm research networks are active in several states, including Arkansas, Mississippi, Oklahoma, Tennessee, Kentucky, Maryland, and Delaware. Current Rodale collaborations with 1890s exist in the Mid-South and Mid-Atlantic networks. Future network activities could move into the southeastern portion of the U.S., including Alabama, Georgia, Florida, and the Carolinas, if there was interest in Rodale collaboration in these regions.

Rodale Institute's internship program offers opportunities for undergraduates considering a career in research. There are openings for 10-15 interns each year, for a 6-to-9 month period. Interns work closely with researchers on all phases of research planning, implementation, data collection, and summarization. Interns attend weekly seminars, and have several opportunities to attend sustainable agriculture confer-
ences and interact with visitors from all over the world who come to Rodale for information and training.

Scientific exchange programs and collaboration are possible. Several researchers from landgrant universities from throughout the United States now collaborate with Rodale researchers, and we have hosted researchers on sabbatical leave on several occasions.

Training in sustainable agriculture is another possible area of future interaction. Rodale is now expanding its training and education program and facilities, and the Institute hosted bus tours from several states sponsored by Cooperative Extension and the Soil Conservation Service. Our facilities now include conference rooms, a small guest house, and numerous field trials. Additionally, Rodale has researchers available to share their experiences in the areas of research mentioned above.

Concluding Comments

The 1890 Land-Grant system and the Rodale Institute have much in common, including an interest in sustainable agriculture, and a grassroots, hands-on approach to working with farmers. Bridges now exist between our institutions, and we can build on these existing relationships to further our mutual interests and goals. There is no time like the present to increase the number of programs that we work on together.

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Perspectives from a Small-Scale Producer on the Challenges Ahead

James Shackleford
Snow Hill, North Carolina

My farm, located in Greene County, North Carolina, consists of 300 acres of land. Twenty-five acres are planted in tobacco, fifteen acres I use for vegetable production, and the remainder I crop in soybeans and corn. Tobacco has always been the main crop in Greene County and the surrounding area. A few years ago I became concerned about all the controversy surrounding tobacco, and I decided it was time to look for other things to grow. This is how I got into vegetable production. Collards, kale, mustard greens and turnips are my mainstays. In the spring I plant early onions and red potatoes. In the fall, I add sweet potatoes to the mix.

My marketing strategies have always involved direct marketing. I started selling produce from the back of a pickup in the city of Wilson, North Carolina, at the same time I started farming full-time — about seven years ago. Over the years I’ve added local grocery stores and restaurants to my list of customers. I now have six grocery stores and two restaurants I sell to regularly, and three or four times a year I haul shipments of vegetables up the Eastern Seaboard.

I got started in farming when I was a little boy, helping my father and mother. There were ten children in the family; my father saw to it we all had chores and responsibilities, and I enjoyed working on the farm. My father gained a great deal of satisfaction from raising his own vegetables and livestock he raised most of the food our family ate, and this too inspired me to become a farmer. My father’s cash crops were collards, chickens, cows and turkeys. He was never intimidated by direct marketing. Loading up the truck for market on Saturday morning was an exciting event for my father and the entire family, and I think this background has given me an attitude towards direct marketing that has been very helpful.

As a young boy I became interested in 4-H. I raised livestock, corn and sweet potatoes as 4-H projects. Being involved with 4-H at an early age instilled with me a good feeling about farming that has remained with me.

For much of my life, I held down a full-time job off the farm while I farmed part-time. Those circumstances eventually gave way to working full-time off the farm and farming full-time. For five years I held down two full-time jobs. When I finally decided to give up the off-farm job and farm full-time, the number of hours I worked in an average week didn’t decline all that much. I devoted more time to marketing and began spending so much of my weekend hours selling produce that I didn’t cut the hours in a typical work-week by too much.

Over the years, my primary source for funding has been the North Carolina Farm Credit Bureau. Last year I received assistance from the North Carolina Farm and Rural Families Coalition. My goal is to one day have a produce stand my children can operate.

I market mostly from the roadside; direct marketing. I found out that this was the most profitable way for me to go about it. I did have some tomato projects with chain stores, but I’ve dropped them to concentrate my energies on direct marketing.

I would like to share some facts regarding the disappearance of small and minority-owned farms.

During the 1980s, the number of farms in the U.S. declined 40 percent, from 2.8 million to 2 million. In 1990, the Congressional Budget Office predicted another 500,000 farmers would go out of business in the next five years, if prices for farm commodities failed to rise considerably. The Budget Office projection recognized that a large
number of farms would continue to operate only because of off-farm income.

Between 1980 and 1991, North Carolina lost 33,000 farms, or 35 percent of its farms. During this same period, total farm land declined by 2,100,000 acres in the U.S.

In 1920, there were 925,710 black-owned farms in the United States. Currently, there are less than 23,000 black farmers in North Carolina. In 1910, black farmers in the U.S. owned 15 million acres of land. Currently, they own less than 2 million acres. Total black land ownership today is less than the amount owned by black farmers alone 50 years ago. In North Carolina, between 1970 and 1987 the number of black operated farms fell from 5,820 to 2,640 — a 55 percent drop. Loss of minority farms is affecting not only rural areas which are losing the farms and their economic input, but also the state’s urban areas, which must absorb the displaced population.

Studies have shown that among African Americans, land ownership nurtures self-reliance, better health and nutrition and confidence in the future. The decline in land ownership among African Americans is a disheartening trend, and I'm glad to see 1890 Research and Extension programs working to reverse it.

Here are some issues that I think agricultural research and extension could help address.

• Funding for Agricultural Research and Educational Outreaches. There was money set aside for educational outreaches to minority farmers in the 1990 Farm Bill — $10 million — which was never appropriated. I think that was a mistake and land-grant institutions should have done more to steer those funds through Congress.

• Historically, there have been many times black farmers did not get the right kind of advice, or they were late getting it. Racism has been a stumbling block, and we must continue to combat it, but there are alternatives to tackling racism head on. I’ve found that pride and a positive attitude thwart racism as effectively as confrontation. Since pride and a positive attitude can be instilled in minority farmers, education which gives them grounds to be proud and think positively is a counter to racism.

• Consumers should be more aware of the challenges farmers now face. It sometimes seems that the general public is not going to pay attention to farmers so long as people find most everything they want at prices they can afford at the supermarkets. There are means other than shortages and exorbitant prices for informing the public of the plight of farmers, and university-based researchers and educators should be leading the way.

• Although there is more opportunity for African Americans than ever before, there are still barriers and one of the most formidable sets of barriers separates black people from money.

Often as not, the barrier is collateral. All the promises, good intentions and set-asides in the world don’t add up to much when the reality is lending institutions want collateral and African Americans don’t have it. There are some opportunities, though right now it’s very difficult for black people to overcome the barriers between them and money.

• We must broaden the agenda of our educational outreaches to minority farmers, and one area in which there is a pressing need for more skills and knowledge is money management. We’ve got to teach our people to save some, manage their money. One of the reasons I’m in farming today is I took my money and did the right things with it. I know there are many farmers who are out of business today who made good money and let it slip through their fingers. Farmers have lost their land because of adversity beyond their control, but there are also farmers out of business because they were irresponsible. We need to address that issue too.

• Let's start educating people as to what farming is all about; that it's not a disgrace to be a farmer. Young people are so negative when I talk to them about agriculture, they don’t want any part of it. The American Farm Bureau’s Ag in the Classroom Program is very good; well worth extending and imitating. There are many things we can do, but what we can’t do is ignore the prevalent negative image of farming. We’ve got to give that image a facelift. Otherwise, agriculture faces some very serious difficulties in generations to come.
Perspectives from a Small-Scale Producer on the Challenges Ahead

Alex Hitt
Graham, North Carolina

I’m a full-time farmer, farming five acres of land. This is my twelfth year as a full-time farmer. I grow small fruit, a wide variety of vegetables, and cut flowers. Everything I grow is a high-value crop. All my marketing is done locally, in the Raleigh/Durham/Chapel Hill area. One-third of my marketing is done at a Saturday morning tailgate market. The remaining two-thirds of my business is with grocery stores and other local outlets.

I try to stay as organic as possible. Not necessarily “certified organic,” but I’ve set my own standards and I never feel I’m misleading customers when I assure them my farm products are organic. I stick to organic production not only because I feel better about it on an ethical level, but also because it’s a customer preference in my markets. The North Carolina Piedmont Triangle is a region with a many colleges and universities, which have drawn high tech industries. There is also a concentration of state and federal government offices in the Triangle. These factors add up to a demographic unusually rich in college students and highly educated professionals, and a large market for organic foods.

Although I grow a number of crops, my overall emphasis is on perennials, and I’ve arrived at production methods which have cut my need for chemical inputs to a little Post herbicide. Many years, I’m able to avoid even that. The annual crops I keep free of pesticides and chemical fertilizers. Occasionally, adversities arise which no organic method can combat and I end up turning a crop under. But because I keep my production diversified and the eggs in several baskets, the loss isn’t insurmountable.

The question I’m asked time and again is, why do you farm this way? I trace my interest in organic production to my college days. My degree is in soils and horticulture. As a student sitting in classrooms in the 1970s — an agriculture student without a farming background, I should add — I kept wondering, do I have to do it this way? Can I make a living on a farm without following all the recommendations for fertilizers, pesticides and herbicides to the letter?

After 12 years of farming and experimenting — a lot of mistakes and a lot of gray hairs — I’ve arrived at the conclusion that the answer is, yes and no. Some of those time-honored production methods I learned in school can be challenged. On the other hand, there are methods I learned about in college which are unassailable at present. Some producers and consumers may not like them, but the alternatives just aren’t viable.

Some of what I’ve learned about sustainable agriculture points to needs for further applied research. I’ve also learned there’s a pressing new relevance for many concepts college agriculture instructors and Extension specialists have embraced for decades. It may be time to redouble efforts to reach small farmers with information.

One time-honored concept which still stands is diversified production. No crop or farm enterprise is fail-safe, and there’s not just a chance of total loss — there are dozens of potential disasters. Diversified production is the best insurance a farmer can have. In addition to the financial rationale for diversification, a mix of enterprises gives small-scale producers a second resource: experience. Niche markets open and close suddenly. Farmers with small farms must be better able to respond than farmers with large farms, who have long-term investments in equipment and other capital outlays which keep them locked in longer than they might wish. But small farmers without experience learning about new crops and production methods and a mindset for adapting, are not better positioned to respond to market fluctuations than large-scale farmers.
Diversification is also an important part of sustainable agriculture. It’s become obvious that monoculture is a vicious cycle, that concentrations of one or two crops draw pests and disease which require more inputs. The inputs lead to higher production levels which, unfortunately, also serve to draw more pests and diseases, and the need for more inputs. On the other side of the coin: diversified production creates ecological balances which keep inputs low.

But more research is needed on diversification as a means for ecological balance which reduces reliance on inputs. What really needs to be examined carefully are holistic farming systems — those designed to maximize the benefits of diversified production. Holistic farming systems represent more than a new frontier for agricultural research. Researchers are going to have to take an entirely new approach to agriculture and offering farmers solutions for their problems.

Because of the nature of the needs farmers have presented to agricultural researchers, research is entrenched in methodology for short-term issues and problems. Researchers identify the problem, solve it and move on to the next one. That’s what is asked of them. We can’t dispense with that responsiveness — it’s still crucial — but we also need to install a better methodology for research aimed at the long haul.

There is also a need for research into diversified production at the most basic level: what to mix and match, and when to do it. I’ve grown more than 100 crops at various times, and I don’t think that’s extraordinary. Diversified production means juggling several crops, organic production means juggling several more. It adds up quickly. Now that I’m looking at 100 crops — factoring in all the considerations, considering all the possible permutations — the result is a schematic that looks like a cross between a DNA molecule and the Solar System. I would like to see much more research activity devoted to the complexities and variables inherent in diversified production, and more comprehensive models that map out complementary rotations.

While some problems I’ve encountered while trying to keep my production mix diversified and sustainable point to the need for agricultural research to reshape its methodology so it can work toward long-term, holistic solutions, I’ve also run into problems that the research system is fully capable of tackling just as it is, but isn’t.

Here are some specific issues related to diversified, organic production which I think should be better investigated by agricultural research scientists:

- Plant varieties. What I come across in periodicals are articles with short lists of “best varieties.” I’d like to know more, and I would like to see the pluses and minuses for organic producers spelled out.

- Crop rotations and other planting considerations. I would like to see more specific recommendations, and timetables. I don’t think enough research has been done on the significance of time lags between plantings. Where do nutrient recycling, cover crops and inter-seeding fit in? Although work has been done on what crops best follow what other crops, it should be expanded. Rotation is the single most important cultural management tool we have.

- Soil fertility management. A lot of discoveries remain to be made regarding the uses of green manure cover crops and animal wastes. I’m not even convinced that the current theories on how green manure cover crops work are conclusive. I’d like to see more work on the fertilizer value of different cover crops.

- Specific, quantified recommendations for all aspects of organic production. When a producer has a problem or a question, there are a lot of theories floating around and advice is plentiful. We need some cold, hard recommendations to serve as reference points for all the theories and advice that are floating around.

Perhaps the problem is information delivery. Maybe researchers have worked on many of the these issues and others which need to be addressed — recommendations are out there — and the missing link is a communications channel, or concise organization that would give farmers easy access to research findings. We’re not only living in the Age of Information, but in an information glut. With so much information available, it’s very difficult to sift through it all to get at what you need. Efforts to get information to farmers should start with organization. Don’t just point us to a mountain of information and tell us to dig in. Catalog and organize the information so we can get at what we want and get it quickly.

The number of farmers in the United States has dwindled to less than two percent of the
population, and although that's a frightening statistic in many ways, it also means that we've got better opportunities to communicate and spread information. There's a smaller audience to reach and all sorts of new technologies for reaching them. Nonetheless, the primary communications channel remains word-of-mouth, farmer to farmer. The new communications technologies are good supplements, but it's a mistake to think they are replacements; not yet, anyway.

An issue I think both agricultural extension and research must address is reallocation of resources. For example, I soil test every year, and I'd love to be able to request green manure recommendations for a lettuce crop. As it is, I take the soil testing lab's results and make an educated guess as to what I need to do. We've got an excellent soil testing lab in North Carolina and I think it's time to put a little more into it so we can get a good deal more out of it; not just for organic producers but for other farmers as well. I'd like to see research funds reallocated to serve a greater variety of producer interests, and I'd like to see Extension facilities and programs adapted to changes in the agricultural community. Farmers have very different needs and priorities than they had a couple of decades ago. If resources aren't reallocated to reflect these changes, we stand a good chance of losing them altogether.

The schools of agriculture at land-grant institutions aren't in a position to stand pat either. Sustainable agriculture isn't a course, it's a reality which needs to be incorporated into the entire curriculum. Schools of agriculture have leadership roles in addressing ecological and environmental concerns, like it or not. They just don't have the option of remaining neutral. If they try to ignore the issues, their position will be decided for them, and chances are they won't like the role they're assigned.

Small-scale agriculture doesn't seem to be getting the attention it deserves from educators or government agencies. Everyone knows that 15 percent of the farms are producing 85 percent of our food, but targeting that 15 percent with programs and outreaches is not proving efficient. It's inefficient to target large farms because the people running them know what it takes to be successful. Aim programs and information at small and medium size farms and the big-time operations will get in on it — they wouldn't be where they are if they didn't know how to do that.

Another very important reason for paying more attention to small-scale agriculture is this: where are the large-scale farmers of tomorrow going to come from if we continue to make it so hard on small and medium size farms? Even the staunchest proponents of big farms and large-scale production have to wonder where farmers are going to come from in the future, if we don't leave space for small and medium size farms in the big picture.

Farmers will continue to look to research and extension for information, but research and extension must look to farmers for information also. Agricultural research and extension have worked because the programs are farm-driven and responsive. Given the many pressures on farmers and the many changes agricultural production is going through, research and extension efforts must be more responsive than ever if they are to succeed.
Sustainable Agriculture and Alternative Crop Production: The 1890 Institutions' Contributions

Dyremple B. Marsh
Cooperative Research
Lincoln University

In these times of limited resources, research programs at most universities are experiencing downsizing of their research efforts. The 1890 institutions are not immune to these cuts and they are being forced to rethink their priorities. Research on sustainable agriculture approaches is still of foremost importance at these universities. They are charged with assisting African Americans and other financially-challenged farmers with their economical needs while still maintaining sustainable practices. At these sixteen 1890 Land-Grant Institutions and Tuskegee University, many successful research efforts have contributed to fulfilling these charges.

This report will attempt to summarize the research efforts at eight of these 1890 institutions. Much of the applied research from these institutions has provided results that are presently responsible for the survival of these family farms. Through fact sheets, workshops, seminars and other literatures the outreach arm of the 1890 institutions has been able to disseminate the successful results of both basic and applied research. The rich tradition of conducting important research on limited funds started with pioneers such as Dr. George W. Carver. After reviewing the research programs at 1890 institutions I can report that the tradition lives on.

Research in Nitrogen Fixation

Research in the area of nitrogen fixation is being conducted at several institutions with varying results. This is a result of the fact that this area remains a priority topic for research funding from USDA. Following are summaries of this research area from several institutions.

At Langston University work has been done on:
1. Evaluation of Rhizobium strain efficiency

Research at Kentucky State University was conducted on the effect of soil acidity on the efficiency of Bradyrhizobium cultures. Researchers at Virginia State University observed improvement of soybean lines for nitrogen fixation and stress tolerance.

At North Carolina A&T State University emphasis was placed on researching genotype specificity to Rhizobium strains. Presently work is also being done on nitrogen transformation potentials of Piedmont soils and N-availability from plant residue.

At Delaware State College researchers have been investigating the use of legumes in animal production. Their results have complemented the Lincoln University research, which shows that legumes such as southern pea provide a high source of protein for developing sheep.
Specialty and Exotic Crops

Another area of research receiving considerable attention is that of the production of specialty and exotic crops. Several 1890 institutions have embarked on researching cultural practices necessary for the production of these crops.

At Lincoln University researchers are investigating the possibilities of growing a day neutral pigeonpea. Factors being studied include: a) climatic requirements; b) nitrogen fixation; c) pod set percentage, and d) pest problems associated with this crop. The research team at Lincoln is also studying the potential of growing kiwano in Missouri. Included in this research is the study of the market potential of kiwano in ethnic markets in the United States.

Scotch bonnet pepper, a hot pepper used in the typical Caribbean and African cuisine, is presently imported into specialty shops across the United States. Researchers at Lincoln University have identified ways that this crop can be successfully grown in the Midwestern. Published reports out of this group showed that yields from pepper grown in Missouri were comparable to those grown in the tropics. Other exotic vegetables being investigated at Lincoln University include Chinese cabbage and vegetable amaranth. Another area of new crop research is that on the production of canola under various tillage systems in Missouri. This work has as its major objective the enhancement of yields, without sacrificing the environment.

At Virginia State University emphasis has been placed on researching herbs and spice production as an alternative for limited-resource farmers. Other alternative crops being investigated include vernonia for industrial oils and soybean as a vegetable. Vegetable soybean is also a major research area at the University of Maryland - Eastern Shore. White pine production by tissue culture is being done at Kentucky State.

National Research Priorities as Determined by USDA

Research at 1890 institutions mirrors not only the needs of clientele it serves, but also the national research priorities as determined by USDA. Additional areas of major importance that are being studied under the main umbrella of sustainable agriculture at Lincoln University include: a) the use of municipal sludge as a commercial fertilizer source to amend soil enzyme activities; b) fate of pesticides in the soil during and after the growing season; c) best management practice in specialty crops; d) the shifts in microbial population due to continuous fungicidal use; e) tillage systems effects on vegetable crop growth and development, and f) effects of tillage frequencies on soybean production.

At Kentucky State University, the research includes a) fate of pesticides and nutrients in vegetable systems; b) yield increase as induced by light management; c) manipulating planting date to reduce chemical control of grain moth, and d) using plastic mulch to reduce irrigation frequency and chemical weed control.

At South Carolina State the emphasis is on studying methods by which existing soil pH levels can be used to control weed/seed germination. North Carolina A&T State University is presently investigating effective and sustainable ways of producing vegetables organically. Sludge amended soils are being studied as possibly the fertilizer of the future. The University of Maryland - Eastern Shore has invested significant time investigating the use of a trap crop technology for control of corn earworm.

The report represents a partial summary of research efforts at several 1890 institutions. In general, 1890 colleges and universities have made significant strides in researching sustainable approaches to agriculture as practiced today.
Sustainable Agriculture and Alternative Crop Production at the 1890 Colleges and Universities

E. G. Rhoden and V. A. Khan
G. W. Carver Agricultural Experiment Station
Tuskegee University

Introduction

Sustainable agriculture has been an integral part of research programs at the 1890 Colleges and Universities since their inception. Many of the states, and, to a greater extent, the counties that are served by these 1890 programs, are entrenched in a cycle of poverty and resource degradation. This is manifested in the inability of such areas to support themselves due to the degradation in soil and water quality resulting from poor resource management (Radcliff, 1987). Coupled with poor resource management is a lack of decision-making capabilities among small-scale farmers with regard to technologies introduced into their communities (Bryant and White, 1984). If providers and promoters of these technologies listen to the small-scale farmers they serve, the lessons would be quite clear: "systems that mimic nature tend to have greater sustainability." However, production-oriented programs are now being blamed for the destruction of natural biodiversity and the degradation of natural resources.

Recognizing that farmers served by the 1890 programs are more prone to fall into the cycle of poverty, these institutions of higher learning have oriented their research, extension and delivery systems to address farmers' needs. To this end, Dr. George Carver in the early 1900s developed the use of peanuts as a soil improving crop. We have since come to realize that the fundamental strategies that have to be developed must include agricultural sustainability. The legacy we have inherited is that limited-resource farmers are the major clients of the 1890 programs. At the same time, they are demanding that methods of sustainability be developed as a part of their agricultural production system. Since these communities are agriculturally based, their viability is rooted in the ability to reverse the decline in their quality of life.

Farmers have always used information developed by institutions of higher learning that provides the avenue to increase the farmer's well-being as well as his community. This information is usually handled in such a manner that the technology that the farmer receives is integrated into his existing farming practices (Adamson et al., 1975). We have come to recognize the fact that agriculture must have a holistic systems approach to farm resource management. The resource management, or systems approach, is considered as the holistic interrelationship among all components of that agricultural community (Wilson and Morren, 1990). This approach takes into account that technology developed for a particular system would be integrated with the natural processes to develop a productive system. If a systems approach is to be developed, the constraints of that system have to be identified. In so doing, it is possible to separate the components that can be managed from those components that cannot be managed and are usually referred to as the environment (Bird et al., 1990).

Sustainable systems are always in a state of flux, and sustainable agriculture must therefore include diversification, integration and to a great extent individualization (Ikerd, 1990). Instead of having stable characteristics, sustainable agricultural systems can be considered as dynamic; that is, they are trading off or changing with time (Martens, 1988). One of the clear-cut shifts in sustainability experienced by small-scale farmers serviced by the 1890 Land-Grant College and Universities is soil loss. When the incremental soil losses caused by unfavorable soil management use are measured, it is apparent that our production system is no longer resilient and decline is inevitable.
Defining Sustainability

The word “sustainability” has been associated with a plethora of meanings and definitions. In the past five years this has been further complicated as its use becomes associated with agricultural production and environmental causes. These definitions have become so obscure that the term’s usefulness in describing research objectives is of little benefit to the researcher. The following two definitions provide an adequate description of sustainable agriculture as it relates to the role of 1890 Land-Grant Colleges and Universities:

Sustainable agriculture involves the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources.

- CIMMYT, 1989

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

- The World Commission on Environment and Development, 1987

If we operate under the premise that these two definitions contain the main ideas and philosophies that the 1890 programs operate under, then we will need to infuse other definitions that might include community characteristics and quality components. Conway (1985), defined sustainability as, “the ability of the system to maintain productivity in spite of a major disturbance such as caused by intensive stress.” Looking at such diverse views as are represented in the literature, one cannot but look at agriculture as only representing an attempt to enhance the productivity of nature for humans at the expense of other species. However, we have to look beyond the constraints of ecology and see productivity as only one component of the sustainable system.

Sustainable Agriculture Research and Education

The 1890 Colleges and Universities are located in the southern United States. Funding for research projects nationally and in the southern region began in 1988. One of the most popular sustainable agriculture programs is known as LISA (Low Input Sustainable Agriculture). In the Food, Agriculture, Conservation and Trade Act of 1990, the LISA program was renamed the Sustainable Agriculture Research and Education (SARE) program. Like other institutions of higher learning in the South, the 1890 Land-Grant Colleges and Universities were asked to submit competitive bids for research and education grants in the following areas:

1. Best Utilization of Biological Applications

   Nationally or regionally mandated projects developed under the “Best Utilization of Biological Applications” area were to obtain data, demonstrate developed technologies with the information gathered, and release this package through educational forums for the farming community. To this end, Congress authorized $40 million, appropriated as follows: $3.9 million in the 1988 fiscal year; $4.5 million in the 1989 and 1990 fiscal years; and $6.7 million in the 1991 and 1992 fiscal years. The southern region received approximately $1.5 million annually from this project. These projects must be designed to:
   a. Reduce, to whatever extent feasible and practical, the use of chemical pesticides, fertilizers and toxic natural materials in agricultural production.
   b. Improve low-input farm management with the view of enhancing agricultural productivity, profitability and competitiveness.
   c. Promote crop, livestock and enterprise diversification.

2. Integrated Management Systems

   Approximately $20 million is authorized by the Congress which will be made available for project development. The projects that are funded should address:
   a. Integrated pest management.
   b. Integrated resource management.

3. Technology Development and Transfer

   The main purpose of this phase is to develop technology for transfer in the following areas:
   a. Technical guides and handbooks
   b. National training program
c. Regional training centers
d. State coordinators and specialists
e. Competitive grants programs.

The $20 million authorized for this phase has not been made available yet. Table 1. represents the projects funded by the Sustainable Agriculture and Agriculture and Education Program (1988-1991).

It should be noted that of the 44 projects that have been funded in the southern region, only three (less than 7 percent) are being conducted at 1890 Land-Grant Colleges and Universities. Dr. B. D. Mayberry noted in 1976 that, “the role of the traditionally black (1890) Land-Grant Institutions and Tuskegee Institute in plant science research parallels that of the traditionally white (1862) Land-Grant Institutions except as dictated by the political climate in which they were created and the restricted clientele for whom they were designed. For more than one hundred years (since the mid 1860s), the influence of the political circumstances has been so overwhelming that any discussion of the traditional black institutions must be conducted against this background” (B. D. Mayberry, 1976). Therefore, the sustainable agriculture research roles of the 1890 Land-Grant Colleges and Universities must also be viewed against the backdrop of such a legacy.

Alternative Crops and Enterprises

New crops and alternative enterprises are being grown and evaluated in the South to determine their adaptability to this region, and, secondly, because of the lower margin profitability of traditional vegetable crops. However, it is important that growers, especially small-scale or limited-resource farmers, become familiar with the production practices of these alternative crops early, so that they can optimize their production before the crops are taken over by more market-conscious producers. As researchers geared towards small-scale farmers’ problems, the 1890 Land-Grant Colleges and Universities have to develop workable guidelines that will help farmers determine the production problems associated with various alternative vegetable crops; determine the potential for success of these crops; give an assessment of the constraints that farmers must overcome; and determine the willingness of potential producers to grow these crops and the acceptability of these new crops or products (Rhoden and Panchoo, 1990; Rhoden et al., 1991; Small et al., 1991a; 1991b). These factors will all have to be judged by satisfying production research needs for local and regional conditions before farmers attempt alternative crop production.

Agribusiness is the principal end-user of any technology developed by the 1890 Land-Grant Institutions. Therefore, the introduction of new crops must be closely linked with the small-scale agriculture industry. Although there will not be an abundance of producers/farmers interested in growing alternative crops, there are usually a few individuals who have vision, foresight and the commitment to diversify their production base. These farmers who are interested in diversifying their farming enterprises must be made aware of the constraints to alternative crop production (Small and Rhoden, 1991). They must also know how to overcome these constraints. If the gap between the information available and the ability to produce the crop is great, the crop will not be adopted.

It is critical that we stress the need for financial support in the development of an alternative crop or the alternative use of existing crops. In order for an alternative crop project to be effective in the southern United States, there has to be financial support to sustain long-term goals. It is necessary to plan a program that will benefit our small-scale farmers and provide a return that will cover all cost incurred in the development of an alternative crop.

Several publications have been written to address some of the constraints of exotic crop production in various areas of the southern United States (Runyan et al., 1986; Rhoden and Dawkins, 1992; Marsh, 1988; Sealy et al., 1988). The southern region with its mild winters and well-distributed rainfall is ideally suited for the production of various under-utilized or introduced crops. For these reasons, disease, weeds, insect and erosion problems will have to be addressed in the production of alternative crops (see Table 2.).

Alternative Cultural Practices at 1890 Institutions for Sustainable Systems

Agroplastic systems are being developed and utilized for a number of 1890 institutions to:
1. Extend the growing season of various high value cash crops.
2. Disinfect the soil of disease-causing organisms and pests by soil solarization.
3. Reduce the use of pesticides by utilizing different color mulches that repel certain insects.
4. Have an effective weed control.

Researchers at Tuskegee University have shown that by utilizing clear or black polyethylene mulch, with or without row covers, the planting of watermelons could commence by March 20. They have also been able to plant okras by April 5 and tomatoes by March 15. At these planting dates, harvest of these commodities would begin by the end of May for okras and by the first week in June for watermelons and tomatoes. By utilizing an agroplastic mulch/row cover system, producers would be able to enjoy approximately one month of high market prices for these commodities, thereby improving their economic well-being.

With the increased awareness of the harmful effects of certain pesticides and the health hazards associated with them, there is a search for alternative methods of controlling pests and diseases. Soil solarization is a non-chemical approach to controlling many of these pests and diseases. A decade of soil solarization work at Tuskegee University has shown that soil solarization is an effective tool for controlling southern blight, root-knot nematodes, and increasing soil fertility.

Recent research work has shown that by utilizing certain types of colored plastic mulches in the fall, squash production is possible since aphids, which spread various mosaic viruses, are controlled by the spectral properties of aluminum painted mulch. The economic results of this study would allow producers to grow squash at a time when prices are very high.

The current trend is to continue research with plastic mulch systems with the aim of exploring how double cropping and/or inter/relay cropping systems could reduce cost by growing compatible crops. The agroplastic work currently being conducted by Khan and Stevens (Tuskegee University) will also explore the use of “walk-in” tunnel systems in order to provide a cool-season cropping system of high value cash crops.

Conclusion

The massive immigration of the 1970s and ’80s have brought about dramatic changes in the vegetables, food crops and products consumed in the United States. This is especially true in metropolitan areas where immigrants concentrate, namely: Los Angeles, New York, Miami and Atlanta. This gives rise to opportunities for small-scale farmers to produce these specialty crops for target immigrant populations close to their farms.

It is difficult to predict which of these vegetables or alternative crops will be the ideal commodity in which to invest time and resources. However, if the trend in exotic foods consumption continues, some of the crops being evaluated at the 1890 Land-Grant Colleges and Universities will offer very good prospects for investment. Scotch bonnet, pumpkins, vegetable amaranth, and Chinese vegetables provide great potential to the Alabama farmer (Rhoden, 1989; McKelvey and Rhoden, 1991; McKelvey et al., 1992; Mortley et al., 1992). Many Chinese vegetables are being grown in Dade County, Florida, and the demand continues to outstrip production (Maynard, 1988). Many of these crops will need careful marketing strategies but their success will depend largely on our ability to promote these products.

As researchers, we need to improve our understanding of new crop production in the South. As growers become more knowledgeable about various alternative crops, greater demand will be made on us. Based on the inquiries received from farmers and other producers, there is no reason not to expect that production of these vegetables will not increase. Therefore, we will have to look at all the production problems associated with alternative crops. Despite the pest and disease aspects of new crop production, we have to assess the possibility of having a product that is free of harmful pesticides. It will take vigilance on our part to produce a wholesome crop that is economically viable.

It is possible that we can find a middle-ground between agricultural profitability and maintaining a stable production system. However, while we develop new technologies for small-scale and limited-resource farmers we have to realize that such technologies do not become readily accessible to our clientele. Nevertheless, small-scale farmers from time to time adjust their production practices and capabilities to derive
benefits from such technologies. We also have to take care in considering some of the practices that we recommend and their relevance to a particular farm. It is important to remember that it is easier to get a small-scale farmer to comply if these recommendations are not complicated.

Finally, these alternative crops might not solve or should not be expected to solve our farm problems. However, they will improve the income of small-scale growers, provide a wider variety of foods, and do so without deleterious effects to our environment.

References


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<th>Project ID</th>
<th>Project Description</th>
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<tr>
<td>LS88-8</td>
<td>Development, implementation and evaluation of low-input crop and livestock systems for the southern region (88-96-2). J. Luna, (703) 231-4823, Virginia Polytechnic Institute and State University.</td>
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<td>LS88-8.2</td>
<td>Low-input crop and livestock systems for the southeastern U.S. (2nd continuation of project LS88-8; also known as LS91-37[120]). J. Luna, (703) 231-4823, Virginia Polytechnic Institute and State University.</td>
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<td>LS88-9</td>
<td>A comparison of cropping systems managed conventionally or with reduced chemical input (88-32-3). L. King, (919) 737-6255, North Carolina State University.</td>
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<td>LS88-10</td>
<td>Solarization and living mulch to optimize low-input production systems for small fruits (88-87-4). K. Patten, (214) 834-6191, Texas A&amp;M University.</td>
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<td>LS88-11.2</td>
<td>Developing and extending minimum input strategies for weed control in agronomic crops. [2nd continuation of project LS88-11; also known as LS91-38(53)]. F. L. Baldwin, (501) 671-2221, University of Arkansas Cooperative Extension.</td>
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<td>LS89-9</td>
<td>Enhancing farmer adoption and refining of low-input intercropping soybean-wheat system (89-55-1). N. W. Buehrling, (601) 566-2201, Mississippi State University.</td>
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<td>LS89-12</td>
<td>Substitution of cultural practices for herbicides to control annual ryegrass and cheat in small grains. J. B. Solie, (405) 745-5431, Oklahoma State University.</td>
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<td>Enhancement of the stability of southern region agroecosystems through profitable transition to sustainable agriculture. K. Jones, (512) 453-1033, Texas Department of Agriculture.</td>
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<td>LS89-16</td>
<td>Development of low-input multiple cropping system for small-scale farms (89-70-5). O. Bandele, (504) 771-2011, Southern University, Louisiana.</td>
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<td>LS89-19</td>
<td>Development of a plan for implementing a low-input sustainable forage production system in the Oklahoma-Arkansas Ozark Highland Region and similar land areas (89-56P-2). M. L. Kennedy, (501) 895-3201, SCS, Arkansas.</td>
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<td>LS90-24:</td>
<td>Development of an environmentally safe and economically sustainable year-round minimum tillage forage production system using farm animal manure as the only fertilizer. J. C. Johnson, Jr., (912) 386-3364, Coastal Plain Experiment Station, University of Georgia.</td>
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<td>LS90-25:</td>
<td>Development of fractionation and treatment systems for poultry litter to enhance utilization and reduce environmental impact. W. C. Merka, (404) 542-1351, University of Georgia.</td>
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<td>LS90-29:</td>
<td>An expert crop rotation planning system (craps) for implementing and evaluating low-input crop and livestock systems. N. D. Stone, (703) 231-6341, Virginia Polytechnic Institute and State University.</td>
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<td>LS90-30:</td>
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<td>LS91-33:</td>
<td>Reference manual of USA resource management strategy (51): budgets for the Mid-South region. L. A. Johnson, (615) 974-7271, University of Tennessee.</td>
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<td>LS91-34:</td>
<td>Total resource budgeting of USA related management strategies. (97): J. R. Crews, (205) 844-3506, Auburn University, Alabama.</td>
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<td>LS91-36:</td>
<td>Pest management and orchard floor management strategies to reduce pesticide and nitrogen inputs. M. W. Smith, (405) 744-6463, Oklahoma State University.</td>
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<td>LS91-37:</td>
<td>Low-input crop and livestock systems for the Southeastern United States. (See LS88-8.2)</td>
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<td>LS91-38:</td>
<td>Developing and extending minimum input strategies for weed control in agronomic and horticultural crops. (See LS88-11.2)</td>
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Table 2.

Alternative Crops Species Being Evaluated at 1890 Land-Grant Institutions

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<tr>
<th>Crop</th>
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<td>Chinese Vegetables</td>
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<tr>
<td>Mui tsai (plum vegetable)</td>
<td></td>
</tr>
<tr>
<td>Gau kok chui (green chili)</td>
<td></td>
</tr>
<tr>
<td>Hellant too (Dutch peas)</td>
<td></td>
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<tr>
<td>Pak tsai (white vegetable)</td>
<td></td>
</tr>
<tr>
<td>Tsoi sum (heart vegetable)</td>
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<tr>
<td>Yin tsai (pink vegetable)</td>
<td></td>
</tr>
<tr>
<td>Ker lan (Chinese vegetable)</td>
<td></td>
</tr>
<tr>
<td>Shanghai pak tsai</td>
<td></td>
</tr>
<tr>
<td>Ginger</td>
<td>Zingiber officinale</td>
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<td>Hot Peppers:</td>
<td>Capsicum chinense</td>
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<tr>
<td>'Scotch Bonnet'</td>
<td></td>
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<td>'Brown Lue'</td>
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<td>'Cayenne'</td>
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<td>'Chilies'</td>
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<tr>
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<td>Carica papaya</td>
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<td>Passion fruit</td>
<td>Passiflora edulis</td>
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<td>Pigeon Peas</td>
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<td>Pumpkin</td>
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<td>Yardlong beans</td>
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<td>Vegetable Amaranth</td>
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<tr>
<td>Vetivergras</td>
<td>Vetiveria zazaniaoides</td>
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1890 Animal Science Research

M. Ray McKinnie
Extension/Research Animal Science Specialist
North Carolina A&T State University

Introduction

Animal science programs have played a major role in helping to build, as well as model, the tradition of excellence in teaching, research, and extension that 1890 Land-Grant Colleges and Universities enjoy today. At first glance, I was overwhelmed by the mere thought of trying to document and summarize the various types of animal science research conducted over the last two-to-three decades at these institutions. Realizing that I would be the presenter and ultimately responsible for the content of this presentation, I exercised “executive privilege” and decided that: 1) I would confine my information search and comments to animal science research reported in the “Biennial Research Symposia” abstracts, and 2) I would only report on animal and poultry research, leaving aquaculture research to Dr. Scott Newton.

I am sure that the 238 papers reported in the symposiums’ abstracts were in no way comprehensive indications of all the research done or reported by scientists at the 1890s. With this in mind, let us examine the research accomplishments of our colleagues and sister institutions in the areas of animal and poultry science research.

Data

Data reported in this presentation was taken from the abstracts of research presented at the Association of Research Directors’ Biennial Research Symposia. Abstracts were obtained for symposiums conducted in 1980, 1982, 1984, 1985, 1987, 1989 and 1992. From these abstracts, a preliminary list was compiled of the number of animal science research papers presented by institution, species, and research discipline. Once a preliminary list was completed for each symposium abstract, the data was combined across institutions, species and research disciplines.

Total numbers of research papers were tallied for each institution over the seven symposiums and across institutions within a given symposium/year. Also, the percentage of institutional participation was determined for each biennial symposium. Similar tabulations were made for research papers by species, disciplines and species research by institutions across symposiums.

Results and Discussion

Institutional participation in the “Biennial Research Symposia” ranged from a low of 62 percent in 1987 to a high of 81 percent in both 1984 and 1989 (Table 1). It should be noted that South Carolina State College is not represented in the data because the institution does not have a department of animal science or an ongoing research program in animal science. Similarly, other institutions may, at times, show a decline in the number of research papers or abstracts presented in the area of animal science over the seven symposiums. This may be due, in part, to a “refocusing” of their research dollars to new high value enterprises, such as aquaculture, commercial vegetables and/or ornamentals. Tuskegee University was the leading contributor to 1890 animal science research, totalling some 37 papers over the period of seven symposiums. Prairie View A&M was second (33 papers), Langston was third (25 papers), Lincoln University fourth (22 papers) and N. C. A&T was fifth (21 papers). Interestingly, only six of the seventeen 1890 colleges and universities presented research findings at all seven biennial research symposiums, those being Alabama A&M, Lincoln, N. C. A&T, Southern, Tennessee State and
Tuskegee universities.

Animal science research, by species, varied within and across the 1890 institutions (Table 2). Between 1980 and 1992, 238 research papers were presented on research involving cattle, goats, poultry, rabbits, sheep, swine and others (rats, mice, in vitro analysis, etc.). Research studies that involved the use of goats led the way with 70 papers, representing 29 percent or roughly a third of all research reported by 1890 scientists at the seven biennial symposiums. Of the remaining two-thirds of research reported, poultry, swine and cattle research accounted for 18 percent, 17 percent and 19 percent, respectively. Given the control over and dominance of the poultry industry by the private companies, it was surprising to see that poultry research was still one of the leading research endeavors for the 1890s.

Forty-five percent of all animal science research reported at the seven symposiums was done in the area of nutrition (Table 3). Again as previously stated, much of this research involved studies in goats to determine their nutritional requirements for the production of meat, milk and fiber. The second most investigated area of animal science research was physiology, the topic of 59 papers or 25 percent of all research reported. Of the remaining 30 percent, management and diseases accounted 14 percent and 11 percent, respectively, and genetics five percent. The low percentage of research conducted in the area of genetics comes as no surprise, given the high cost of conducting genetic research in large animals. However, several of the 1890's — Florida A&M, Langston, Prairie View A&M and Virginia State — have shown a growing interest in moving towards more research in the area of genetics in an effort to help in the development of a "true" breed of meat goat in the U.S., or in improving the carcass quality of goats currently being slaughtered for meat in this country.

Species research by institutions, again, varied within and across the 1890 colleges and universities. When the research data is broken out across the 17 institutions, certain patterns and trends reflect research interests and areas of expertise among the 1890s (Table 4). Tuskegee University stands out as a leader in animal science research with 37 papers covering all species, except sheep, and as a leader in swine research with 15 papers. The bulk of their swine research has been in diseases and disease control, and this is attributable to the tireless efforts of E. M. Jenkins to resolve the problems associated with swine dysentery. Southern University, although not as prolific as Tuskegee and others, has published across all species and has published far more research on rabbits than the one paper cited in this report. James McNitt, a member of Southern's research staff, has published extensively in the Journal of Animal Science and Journal of Applied Rabbit Research on "suckling and nest box behavior" in rabbits. The same is true of Steve Lukensfahr's rabbit research program at Alabama A&M University. Also, let's be mindful of the fact that the research programs of Delaware State, Kentucky State, and University of Arkansas - Pine Bluff have tended to concentrate their energies, monies, and resources in the area of aquaculture.

Based on the data presented at the seven research symposiums between 1980 and 1992, 1890 colleges and universities have some areas of genuine expertise to offer animal science research. These areas include research in dairy and meat goat production. Langston, Prairie View A&M and Tuskegee have pioneered much of the research and information published in the U.S. on goats (Table 4). These institutions, especially Langston, have been the flagships of the 1890s in terms of technological advancements, publications and information disseminated on the production and marketing of goat meat, milk and fiber. However, they are no longer our sole sources of information and expertise relating to goat production. Other institutions, such as Fort Valley State, Florida A&M, Southern and Virginia State, are developing research programs and research expertise in dairy and meat goat nutrition, physiology, genetics and management. This is sure to further strengthen the 1890s position as the premier source of information and technology relating to the production of goats in the U.S.

Lincoln University has been dominant in the area of sheep research, and to a lesser degree in swine research, with some 19 papers having been presented on sheep and swine reproduction, nutrition and management. Conversely, research with cattle has been more diffuse, involving 62 percent of the 1890s. North Carolina A&T and Tennessee State universities have led the way in cattle research, with a total of 13 papers presented between the two institutions. Similarly, in the area of poultry, Prairie View A&M and the
University of Maryland - Eastern Shore have modeled the way for 1890s with 19 abstracts for poultry research given at the seven biennial symposiums. With the exception of goats, research in all the species has remained fairly static over the seven symposiums, showing no tremendous gains or losses in the numbers of papers presented.

Summary

Animal science research continues to play a major role in the establishment of research credibility and excellence among the 1890 Land-Grant Colleges and Universities. The 1890s domination of certain areas of research, such as the production and marketing of goat meat, milk and fiber, is unprecedented and will continue to grow given the current level of interest in goat products in the U.S. Given their small staffs and research budgets and flexibility in research priorities, 1890s must continue to not only “model the way” in terms of non-traditional avenues of animal science research, but they must also continue to be contributors of scholarly information to the general body of knowledge in animal science. They must be risk-takers and willingly seek out those opportunities for difference and distinction rather than shy away from them. In closing, the 1890 colleges and universities have had a glorious past but are in possession of an even brighter future. So, let us continue to “Challenge the Past to Build the Future.”

### Table 1.

**Animal Science Research Reported at 1890 Biennial Research Symposia, 1980-1992**

(Animal Science Research - Animal and Poultry Research Only)

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By Disciplines

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Table 4.
Animal Science Research at 1890s Reported at 1890 Biennial Research Symposiums, 1980 -1992
(Includes all other types of animal research - rats, mice, in vitro, etc.)

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* No Animal Science Department or Research Program
Overview of Aquaculture Research at 1890 Land-Grant Institutions

Scott H. Newton
Research Associate
Virginia State University

Aquaculture may be defined as: "the propagation, rearing enhancement, and harvest of aquatic organisms in controlled or selected environments, conducted in marine, estuarine, brackish or fresh water."

Aquaculture is Agriculture

Since the early 1970s, approximately half of the 1890 Institutions have initiated aquaculture or aquatic science programs. In addition to research projects, most programs have extension programs and educational courses or curricula. Most 1890 aquaculture programs are supported by USDA funds; however, several have state funding as well as auxiliary grant funds periodically for particular projects. Although these programs are smaller and younger than other aquaculture programs, such as those at larger universities, they have been very productive and are presently recognized as significant contributors to the U. S. aquaculture industry.

Collectively, over 500 scientific articles have been published by 1890 aquaculture project programs. Many of these studies have been presented at state, national, and international conferences. Additionally, many of these articles have appeared in various trade journals, magazines, industry news papers, and association newsletters in forms that better convey information to fish producers and other interested user groups. In general, most programs have given priority consideration to providing information for smaller scale operations, non-traditional producers, and those interested in alternative agricultural activities. At the same time, useful information has been generated for all segments of the aquaculture industry.

Arkansas
The University of Arkansas - Pine Bluff
The aquaculture program at the University of Arkansas - Pine Bluff was initiated in 1974 with USDA/CSRS funds. Over the years a large complex of small ponds has been established with accompanying hatchery, wet laboratories, a temperature controlled feed storage shed, and well sheds.

Early research was with catfish, rainbow trout, and polyculture combinations of the Chinese carps with catfish. Numerous cage culture experiments have been conducted, mainly with catfish, but also including several other species of fish as well.

For additional information on the Arkansas (UA-PB) program, contact: Drs. Carole Engle or Nathan Stone, Department of Agriculture, Pine Bluff, Arkansas 71601; (501) 543 - 8537.

Delaware
Delaware State College
Delaware State College is located in metropolitan Dover; however, aquaculture facilities are located on the immediate campus and near to laboratory and office buildings. There has been an active aquatic research (pond management) program at Delaware State College since 1974. In 1985, the research program was expanded to include production aquaculture. Facilities include approximately 30 experiment pools, water supply reservoirs, 20 outdoor tanks, and a wet laboratory. Additionally, aquaculture offices, aquaria rooms, and laboratories are housed in the Agriculture and Natural Resources Research Complex. A research pond complex is under construction with plans for completion of phase I during 1993. This complex will have 34 ponds for finfish and crawfish research studies. The water supply system will be from rainfall and wells, and is
designed to eliminate discharges to maximize use of water supplies.

Present research studies include: 1) crawfish biology, reproduction, and aquaculture production systems; 2) hybrid striped bass fingerling production in small ponds; 3) winter production of rainbow trout; and 4) evaluation of small-scale production methods for bait fishes. Future research plans include experiments in water treatment using aquatic plants, and exploration of other small-scale aquaculture opportunities in the Delmarva region.

Areas of cooperative research interests include:
1. Management, reproductive biology, and production of crawfish
2. Domestication of striped bass for aquaculture production

**Florida**

**Florida A&M University**

The Florida A&M University aquaculture program is still in the project initiation phase. A USDA/CSRS funded project is evaluating use of several forage fish for feed cost reduction in small-farm catfish production.

In addition, plans are to operate a cage culture demonstration for entry level aquaculturists, and to have one pond operate as a low-technology recirculation system to demonstrate higher production densities which may be attainable.

The Florida A&M University aquaculture facility is located on the Small Farm Center, six miles north of Quincy, Florida. The facility consists of twelve 0.1 acre ponds, one 0.5 acre detention pond, and one two-acre pond. Due to limited water supply, ponds are lined to prevent percolation loss of water.

Areas of cooperative research interests include:
1. Water quality and aquaculture effluent affects on wetlands
2. Biotechnology applications for aquaculture

**Kentucky**

**Kentucky State University**

Kentucky State University has been involved in an aquaculture program since the early 1980s. The Aquaculture Research Center was constructed in 1985-86, and became fully functional in 1987. The Center consists of a 2,000 square-foot research hatchery, a 4,000 square-foot office and laboratories building, a pond complex with 33 ponds and two water supply reservoirs, a farm pond for cage culture, and a brood fish pond. A new 3,000 square-foot nutrition laboratory is under construction and nearing completion.

The Kentucky State University aquaculture research program has striven to increase the knowledge base in aquaculture, and thereby allow for increases in farm income from productivity of on-farm water resources. Research has been aimed at developing production technologies suitable for the climatic and physiographic conditions in Kentucky. Initial research efforts were with cage and pond culture techniques with channel catfish and rainbow trout. Current research topics include: 1) comparison of two strains of blue and two strains of channel catfish; 2) evaluation of stocking sizes and densities in green sunfish X bluegill hybrids; 3) determination of age and size relationships for sexual differentiation of paddlefish; and 4) evaluation of winter protein requirements of blue catfish.

Future research will address studies to “Alternative Aquaculture Species for Kentucky,” in order to assist the rapidly developing aquaculture industry with production alternatives to catfish and trout. Additionally, with completion of a new nutrition laboratory, complementary research will begin on the nutrient requirements of these alternate species, as well as the principal species. Research will continue with paddlefish to evaluate “All female Production of Paddlefish” for their roe production as caviar.

Areas of cooperative research interests include:
1. Reproductive aspects of paddlefish
2. Nutrition and diet development with crawfish and shrimp
3. Culture, management, and food value of hybrid sunfish

**Maryland**

**University of Maryland - Eastern Shore**

For information on the University of Maryland - Eastern Shore Aquaculture Program, contact: Dr. Thomas Handwerker, Small Farm Institute, Princess Anne, MD 21853; (410) 6516623.
Oklahoma
Langston University

Langston University is located in north central Oklahoma about 35 miles northeast of Oklahoma City. Initially, cooperative projects were conducted with the Oklahoma U.S. Fish and Wildlife Research Unit, beginning in 1979.

The Langston program started with extension farm pond and cage culture activities as the main areas of emphasis. Present facilities include 12 quarter-acre ponds, four one-acre ponds, and a 290-acre lake for caged fish culture research. Langston also has a ten-unit recirculating tank culture facility. A 48 pond facility is under construction, scheduled for completion in 1994, which will have a gravity pond water supply system and a water recirculation system. Later, a hatchery and wet laboratory facility will be constructed in conjunction with the pond complex.

Current research aims are to improve profitability of channel catfish culture in open ponds through: 1) polyculture with bighead carp to produce additional income and improve water quality; 2) reduced feed costs through improved feed conversion efficiencies; 3) reduced aeration costs along with improved feeding and water quality management practices. The overall goal is to obtain a better understanding of nutrient cycling in fish culture ponds and improve production efficiencies through various polyculture combinations with catfish.

Areas of cooperative research interests include:
1. Water quality management strategies in fish culture ponds
2. Production strategies to maximize nutrient efficiencies

South Carolina
South Carolina State University

The Department of Agribusiness at South Carolina State College began a USDA aquaculture project in 1991. A three-year study on caged catfish production systems for low-income residents was initiated, in cooperation with Clemson University, to evaluate economic feasibility for small farm operations. The study was a pilot field project utilizing farm pond sites for fish production. Project production and economic data are currently being analyzed, and the economic feasibility of caged catfish production is being evaluated.

Future research plans include: 1) studying the economic feasibility of low-input aquaculture systems for small farm operations in South Carolina, and 2) marketing alternatives for different aquaculture species.

Areas of cooperative research interests include:
1. Cooperative projects which involve student internships
2. General aquaculture production systems and marketing alternatives

Virginia
Virginia State University

The Virginia State University aquaculture program was initiated in 1985 with USDA/CSRS funds. Currently, USDA funded research activities consist of freshwater shrimp and purslane projects. In 1988, a State Aquaculture Initiative was funded by the General Assembly. State funds for aquaculture research at Virginia State University were directed primarily at open pond and cage culture production of hybrid striped bass and companion species.

Facilities at Virginia State University include 57 ponds, with electricity, a hatchery, laboratories, feed storage, office facilities, a three-source water supply system, and space in a greenhouse for hydroponic research and demonstration projects.

In 1989, reciprocal hybrid striped bass were first produced in Virginia by Virginia State University researchers. Experiments have been conducted with all three phases of hybrid bass production since 1987. The first commercial harvests of hybrid bass in Virginia occurred in November, 1989. Currently, there are over 50 farm operations which hold state permits to produce hybrid striped bass. Since 1985, rainbow trout have been reared during winter under a variety of cage culture experimental conditions in farm ponds. During the warm water season, catfish or hybrid striped bass may be reared and then trout reared during the winter. By using this technique of double-cropping, two crops of fish can be realized from the same cage each year. Virginia fish producers’ third season of commercial winter rainbow trout culture is currently underway. High density pond culture of catfish is currently being examined at Virginia State University. Plans are to initiate a catfish hatchery and to
evaluate catfish strains suitable for production in Virginia. Beginning in 1993, all production studies will include detailed disease and parasite monitoring for hybrid bass and channel catfish reared in cages and ponds.

Areas of cooperative research interests include:
1. Commercial feeds and related nutritional evaluations for hybrid striped bass
2. Domestication of broodfish for hybrid striped bass production
3. Water quality and effluent reuse from aquaculture facilities
4. Economics of sustainable hydroponic aquaculture systems

Louisiana Southern University
During the years 1983 - 1988, Southern University had an active aquaculture research program. This program was supported with state funds and Dr. Jay Huner was the research leader for aquaculture activities. Most of the research revolved around crawfish, but research activities also included a variety of other studies: especially in the areas of polyculture and alternative aquaculture species. At present, Dr. Huner is located at the University of Southwestern Louisiana, Lafayette, Louisiana; (318) 231-5239.

Table 1.

1890 Aquaculture Projects

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<tr>
<td>Bernard Petrosky</td>
<td>Delaware State College</td>
<td>Dover, Delaware 19901 (302) 739-5189</td>
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<td>Delaware State College</td>
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<tr>
<td>Glen Gebhart</td>
<td>Langston University</td>
<td>Langston, Oklahoma 73050 (405) 466-3836</td>
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<td>Carole Engle</td>
<td>University of Arkansas - Pine Bluff</td>
<td>Pine Bluff, Arkansas 71601 (501) 543-8537</td>
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<td>Jeff Wilcox</td>
<td>Florida A&amp;M Aquaculture Project</td>
<td>Tallahassee, Florida 32307 (904) 599-3187</td>
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James Tidwell
Aquaculture Unit
P.O. Box 196
Kentucky State University
Frankfort, Kentucky 40601
(502) 227-6041-6581
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FAX: (803) 536-8066

Thomas Omar-Alwawala
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Petersburg, Virginia 23906
(804) 524-5957

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Enhanced Information Transfer

Fields C. Gunsett
Department of Animal Science
North Carolina A&T State University

Premise

Society is changing rapidly in the way that it uses information. Information is collected on virtually everything; utilization of this information is facilitated by the connectivity of various data entry devices, computers and electronic networks. Powerful computing resources and inexpensive storage allows for information to be collected whenever possible.

Corporations tie information data bases by electronic networks allowing access by employees at anytime from anywhere in the world. Limitations to the access of information created by traditional boundaries are rapidly being changed, creating a need for innovative methods to manage information. No longer does the user need to be at a specific location at a designated time, the process of obtaining or providing information can occur at any time from any location.

Convenient, easy linkage between the user and the source of information is critical to the utilization of information. Electronic networks may provide a technology that will lead to more efficient communication of information. Internet is a network of networks that currently provides universities, government agencies and corporations a method of communication. The evolution of Internet into the National Research and Education Network (NREN) promises to link extension, research and educators together so that they may share ideas and information.

Many agricultural professionals who could utilize this technology are not prepared to travel the fiber optic networks that will carry information at giga-byte speeds. Individuals who are lacking the skills to navigate this information network are unable to exploit the innovative resources that are available. Users who rely on traditional communications methods will lag behind the adapters of new and innovative communications technologies.

The purpose of this paper is to try to provide adequate evidence to motivate extension workers, researchers and academic faculty to investigate the use of information transfer technologies. The principle point of discussion will be the use of the resources currently available on Internet and the potential for future collaborative efforts to use this technology to meet the challenges of the future.

Motivation

Two concepts need to be defined to help understand why electronic networks can be used to help meet the communications needs of today's agricultural professionals. The principle activity that these professionals spend time performing is the communication of information. According to Webster's New Collegiate Dictionary, communication is, "the act or instance of transmitting or an exchange of information," and information is, "the communication or reception of knowledge or intelligence."

It would appear that the value of information is greatly enhanced if it can be communicated to others. The ability to generate new information is also dependent on the ability to access and manage existing information.

Information is growing exponentially, doubling in less than three years (Martin, 1990). Disciplines are becoming more specific, creating a need to produce more journals which are directed toward smaller groups of highly specialized professionals. The overwhelming quantity of information available makes it increasingly difficult for extension professionals, scientists or educators to maintain anything but a basic awareness across their discipline.
The day has passed when all of the scientific journals that impact a discipline can be read on all facets of a problem. Single source solutions will solve only the most basic of problems. The interactions that influence any problem are becoming increasingly complex. A complex matrix exists that links all of the factors that must be considered when examining all possible iterations when trying to determine the optimal solution. Solutions will be derived by combining information from a variety of sources. Mechanisms must be investigated that allow efficient collating and melding of information.

An age has begun where information equates to power. Regardless of discipline, those who have access to information can reduce the risk associated with the decision making process. As the quantity of information increases, so will the need to be more reliant on innovative ways to manage, transmit, access and manipulate this commodity.

Potential Solutions

Two technologies that seem to offer assistance with the problem of accessing and managing information are microcomputers and electronic networks. Agricultural professionals will no longer be able to rely solely on bulletins, journals and textbooks to solve problems. Rather, they will need to be able to draw from a larger resource pool, communicate with other specialists, share resources and transmit information.

Currently, Internet meets the communication needs that have been identified. The foundation of the Internet began in the early 1970s as a project funded by the United States Defense Department, ARPANET. The motivation for ARPANET was to improve communications among researchers funded by the Defense Department (Krol, 1992).

The National Science Foundation was funding the establishment of super-computer centers around the country and recognized the need to access these resources from remote locations. It was determined that an electronic network would be the most efficient way to provide users access to computing resources and used ARPANET as a model.

NSF’s adoption of computer networking for communications provided utilization of super-computing technology by users at any institution that was able to access the network. The NSF promoted universal educational access to the network. The evolution of NSF’s network continued to what is now referred to as the Internet.

The Internet now consists of a network of networks. A common set of guidelines and protocols have been developed that have allowed networks to work together. Internet is not limited to the geographic borders of the United States it is instead a global network currently available in over 40 countries. Communications on the network are currently growing at a rate of 20 percent per month (Graves, 1992).

One problem with using the Internet is that there are no well defined documents or instructions pertaining to what is available or how to use the Internet. A variety of documents exist on the network that try to provide new users information on how to use the Internet, but these have generally been written by users of the network and are not always useful to novice or new users. Table 1 identifies some useful resources concerning the Internet and provides the commands to access a few of these files. One problem with these documents is that basic understanding of the Internet is required to transfer them — a form of a high tech Catch 22.

Recently, The Whole Internet Catalog and Users Guide was written by Ed Krol and published by O’Reilly and Associates, Inc. The book reflects the need for a well documented source of information to utilize Internet.

Internet provides the user with three primary activities: (1) communications with other users, (2) file transfer, and (3) ability to establish an interactive session with another computer on the network. Each of these activities can be used to allow efficient communication of information between users.

The most basic use of Internet is as an electronic mail (E-mail) system. Although communications between two users is common, the use of discussion groups appears to be the most popular use of mail. This allows groups of users with common interests to interact through a high-tech party line. Table 2 presents an abbreviated listing of discussion groups that may be of interest to agricultural professionals.

Use of any mail system requires knowledge of the address of the person to whom mail is to be sent. Interaction with a discussion group requires a subscription process that allows the users’ mail
address to be added to a distribution list. Internet now allows for gateways to other network systems. This allows mail to be sent to and received from users who only have access to BITNET.

A second use of Internet is to facilitate the transfer of files across the network. This file transfer system is generally referred to as anonymous FTP (anonymous File Transfer Protocol). It is called “anonymous” because an account is not required on the system that is being accessed.

Anonymous FTP is useful as an archival system for large documents or databases. The files are stored at a common location and can be revised and maintained as necessary. The information that is stored may be in any digital form: text, graphics, numeric or binary. The information presented in Table 1 is obtained by using anonymous FTP.

The third principle use of Internet is the resources available on remote computers. Access is not limited to simply transferring files, but allows for complete use of the resources maintained by the host. Common Telnet applications are use of public services, access to library card catalogs and a variety of other remote services.

One example of Telnet applied to agriculture is PEN Pages. PEN Pages provides a complete information server, providing information pertaining to rural life. The host also maintains information from USDA along with regional information. Table 3 provides a listing of a few Telnet resources that impact agriculture.

The use of any of these resources will provide an efficient means of communications between individuals. Not every user will find value in each of the services offered by the Internet. But, as the overnight mail and fax transmissions are currently used in place of first class postal service, computer networks can also be used as a communications mechanism.

Conclusion

The Internet provides the fundamental resources to improve communications. This form of communication can be best described as “computer-mediated communication” (Holden and Mitchell, 1993). Computer-mediated communication is an efficient resource available to groups of individuals with common interests. It is flexible enough to meet the rapidly changing needs of information management.

Regardless of an individual’s interest in the technology - the technology will continue to evolve. It must be recognized that we are well into the information age. Groups with common interests can extend their resources by using new technologies to manipulate and manage information. Just as scientists have developed new technologies to solve problems, users of information need to adopt new technologies for communications. An opportunity exists to enlist technology to solve problems. Hesitation will only cause groups with limited resources to continually attempt to try to catch up.

The 1890 community represents a group of trained professionals with common problems and interests. Our institutions are generally under-funded and undermanned - limiting our ability to meet all of the needs of our clientele. The innovative management of information transfer technologies provides a mechanism to pool resources and extend the domain in which we have traditionally been limited. The traditional perspective of what resources are available to solve problems must be changed to one with virtually limitless domain. Rather than a static system reliant on local personnel a dynamic system can be envisioned - a system that is not limited by geographic boundaries, physical resources or time.

The author would like to acknowledge the assistance provided by Dr. David Libby of the Department of Animal Science at North Carolina A&T State University in developing this paper.

Literature Cited


### Table 1.

**Information Accessible by Internet Pertaining to Resources Available on Internet**

| Not just cows: A Guide to Internet/Bitnet Resources in Agriculture and Related Sciences
| Wilfred Drew (drawwe@snymorva.bitnet) |

ftp ftp.sura.net  
name: anonymous  
password: [Enter your E-mail address]  
cd pub/nic  
get wholeguide.txt

| Exploring Internet: An Extension Agent’s Introduction to Networking
| Tom Tate (ttate@esusda.gov) |

Send E-mail to “almanac@esusda.gov”  
In the E-mail the following message:  
send internet exploring-internet

| Guide to Internet Resources |
| ftp ftp.sura.net |

name: anonymous  
password: [Enter your E-mail address]  
cd pub/nic  
get wholeguide.txt

### Table 2.

**Resources Currently Available on Internet and Bitnet That May Interest Agricultural Professionals.**

| Address: usda.announce |
| Type: Announcements |
| Description: Announcements of new news groups, publications, and assorted ES-USDA publications. If you want to be made aware of changes at ES-USDA, subscribe to this group. |

| Address: usda.news |
| Type: Server |
| Description: Press releases from the Office of Public Affairs, USDA. |

| Address: usda.cdev |
| Type: Server |
| Description: Current Developments is a weekly newsletter from the Administrator, ES-USDA, to state Extension directors and administrators. Content focuses on matters of national significance to all partners in the Cooperative Extension System. |

| Address: usda.cite |
| Type: Server |
| Description: CITExtension is a semi-monthly newsletter from the Communication, Information, and Technology (CIT) staff of ES-USDA. Aimed primarily at state counterparts in all areas of communications and technology, there is much useful information about technological advances inside and outside ES-USDA, as well as items about writing and editing (word usage, grammar, punctuation, structure), desktop publishing, video and audio teleconferencing, computer hardware and software, workshops, conferences, and other subjects of general interest, with a communications/technology slant. |

| Address: usda.inside |
| Type: Server |
| Description: Denver Browning’s famous INSIDE INFORMATION. This is being made available to Internet sites. |

| Address: usda.global |
| Type: Server |
| Description: Articles from the USDA Office of Public Affairs, produced by Stan Prohaska, which deal with global changes. |

| Address: usda.biofuel |
| Type: Server |
| Description: Articles from the USDA Office of Public Affairs, produced by Stan Prohaska, which deal with biofuels. |

| Address: usda.1890cc |
| Type: Server |
| Description: CES 1890 Computer Coordinators (managed by Sheila Miller)  
Contact: smiller@esusda.gov (Sheila Miller, USDA ES CIT) |
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<th>Address: usda.dvm</th>
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<td>Description: Recent additions to the ES Research Results Database (RRDB). Contact: <a href="mailto:sconn@ususda.gov">sconn@ususda.gov</a> (Steven R. Conn, USDA ES CIT)</td>
<td>Description: USDA Extension Service publication on vet. medicine. Publication managed by Bonnie Buntain. Address: usda.fenews</td>
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<td>Description: Official communications of the ES/CS National Information Technology Standards Management Committee (NITSMC). Contact: <a href="mailto:sconn@ususda.gov">sconn@ususda.gov</a> (Steven R. Conn, USDA ES CIT)</td>
<td>Description: Family Economics News, a monthly newsletter published by Extension Service, USDA; written for Cooperative Extension System educators working with family economics, family resource management, and consumer education topics; contains research abstracts, details about new Extension educational materials, and updates of activities of the Federal Extension partner. Address: famnet</td>
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<td>Description: Public discussions related to the activities of NITSMC. Message related to specific NITSMC standard practices should be directed to the forum mailer for the standard in question. Contact: <a href="mailto:sconn@ususda.gov">sconn@ususda.gov</a> (Steven R. Conn, USDA ES CIT)</td>
<td>Description: FAMNET is a discussion group for Extension specialists interested in programs and issues related to families, children, and youth. The purpose of FAMNET is to facilitate timely communications between and among Extension specialists. FAMNET would include: timely dissemination of information on calls for proposals from other federal agencies, sharing of research, evaluation methods or data, resource materials, data on families issues or trends, public policy issues, coming events, etc. Specialists would also be able to share plans for new programs and seek others to network with in the developmental process. Contact: <a href="mailto:rdaly@ususda.gov">rdaly@ususda.gov</a> (Ron Daly, USDA ES HEHN)</td>
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<td>Description: Official communications of NITSMC working group ES1, Encoding of Electronic Documents. Contact: <a href="mailto:sconn@ususda.gov">sconn@ususda.gov</a> (Steven R. Conn, USDA ES CIT)</td>
<td>Description: Official communications of NITSMC working group ES1, Encoding of Electronic Documents. NOTE: All subscribers to std.es1.action will be automatically added to std.es1.forum. Contact: <a href="mailto:sconn@ususda.gov">sconn@ususda.gov</a> (Steven R. Conn, USDA ES CIT)</td>
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<td>Description: Official communications of NITSMC working group ES2, Digital Data File Exchange via National Networks. Contact: <a href="mailto:sconn@ususda.gov">sconn@ususda.gov</a> (Steven R. Conn, USDA ES CIT)</td>
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<td>Description: Official communications of NITSMC working group ES4, Archiving Educational Materials in All Media. Contact: <a href="mailto:sconn@ususda.gov">sconn@ususda.gov</a> (Steven R. Conn, USDA ES CIT)</td>
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<td>Name: Ag. A.M.daily national agriculture news Service: Almanac mailing group server Address: <a href="mailto:almanac@ususda.gov">almanac@ususda.gov</a> To Subscribe: Send an e-mail message to <a href="mailto:almanac@ususda.gov">almanac@ususda.gov</a>. In the message type the following: subscribe usda.agm. Name: CITE:Extension ES-USDA bimonthly newsletter focusing on communications and technology Service: Almanac mailing group server Address: <a href="mailto:almanac@ususda.gov">almanac@ususda.gov</a> To Subscribe: Send an e-mail message to <a href="mailto:almanac@ususda.gov">almanac@ususda.gov</a>. In the message type the following: subscribe usda.cite. Name: ES-USDA Press Releases from Office of Public Affairs Service: Almanac mailing group server Address: <a href="mailto:almanac@ususda.gov">almanac@ususda.gov</a> To Subscribe: Send an e-mail message to <a href="mailto:almanac@ususda.gov">almanac@ususda.gov</a>. In the message type the following: subscribe usda.news.</td>
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AG-FOST@IRLEARN: BIOSCI: AgroForestry E-conference
List for discussion of AGROFORESTRY — the cultivation of trees
in conjunction with the raising of animals.
Bitnet/Earn: LISTSERV@IRLEARN
Internet: LISTSERV@IRLEARN.UCD.IE

AGPGMR-L@WSUVM1: Ag. Programmers Inter/Intra-
Disciplinary Interest Group
Audience: Agricultural programmers, administrators, students,
etc. with multi-disciplinary computer questions or otherwise
unique computer questions for the agricultural community at
large.
Suggestion: With virtually infinite possible cross-disciplinary
and unique (AG) computer questions.
Bitnet: LISTSERV@WSUVM1
Internet: LISTSERV@WSUVM1.BITNET@CUNYVM.CUNY.EDU

AGRIC-L@UGA: Agriculture Discussion
Topics may include, but are not limited to: Grassland hus-
bondry, crop science, simulation of ecological processes and
crop production, (tropical) forestry, plant physiology, land
development, water resource management, irrigation science,
soil science, plant propagation, cattle breeding, pig farming.
Bitnet: LISTSERV@UGA
Internet: LISTSERV@UGA.CC.UGA.EDU

AQUA-L@VM.UOGUELPH.CA
The Aquaculture E-conference for individuals interested in the
science, technology and business of rearing aquatic species. In
the spirit of open discussion, membership in the list is public
and unrestricted. Topics include: What's doing what and
where? Problems and solutions rearing aquatic larvae.
Diseases, parasites and pathology. Water quality. Recirculation
technology and applications. Research aquatic systems design
and operation. Commercial aquatic systems design and
operation. Site selection.
Bitnet: LISTSERV@UOGUELPH
Internet: LISTSERV@VM.UOGUELPH.CA

BEE-L@ALBNYVM1
BEE-L is for the discussion of research and information
concerning the biology of bees. This includes honey bees and
other bees (and maybe even wasps). We communicate about
sociobiology, behavior, ecology, adaptation/evolution,
genetics, taxonomy, physiology, pollination, and flower nectar
and pollen production of bees.
Bitnet: LISTSERV@ALBNYVM1
Internet: LISTSERV@UACSCCZ.ALBANY.EDU

BIO-INFOS@IRLEARN.BITNET
LISTSERV@IRLEARN.BITNET
BIOSCI: Biological-Information-Theory Bulletin

BIO-JRNLS@IRLEARN
BIOSCI Bio-Journals E-conference: Postings of Biological
Journal tables of contents.
Bitnet: LISTSERV@IRLEARN
Internet: LISTSERV@IRLEARN.UCD.IE
**Table 2. (continued)**

| BIO-NAUT@IRLEARN | BIOSCI, Bionauts E-conference: Directory of Biologists' online. The main purpose of the list is to facilitate communications between life scientists. This list will have three main functions: 1) It can be used to ask questions about networking addresses of scientists in the biological life sciences. 2) If you have small databases of e-mail addresses related to your interests they can be uploaded. 3) If you subscribe you will be asked to send ONE MESSAGE to BIO-NAUT which gives a brief outline of who you are and your main interests. Instructions on the format of this message will be sent to all subscribers individually. Bitnet: LISTSERV@IRLEARN Internet: LISTSERV@IRLEARN.UCD.IE |
| BIO-SOFT@IRLEARN | BIOSCI-Soft: Discussion distribution of the Usenet newsgroup BIOSCI-SOFTWARE. The BIOSCI-SOFTWARE newsgroup is not moderated. Questions, answers, and discussions are welcomed about software related to the biological sciences (or even about problems with other software that scientists might use in the course of their work such as word processors or communications software). Send subscription Requests to one of the addresses below: BIO-SOFTWARE@SGNET.BIO.NET@VM1.NODAK.EDU bio-sof@SGNET.BIO.NET BitNet |
| BIOCIS-L@VM.BITNET | BIOCIS-L: Biology Curriculum Innovation Study LISTSERV@VM.BITNET |
| BIOFORUM@IRLEARN.BITNET | BIOSCI Forum Bulletin Board LISTSERV@IRLEARN.BITNET |
| BIOJOBS@IRLEARN | BIOSCI Employment E-conference Bitnet/Email: LISTSERV@IRLEARN Internet: LISTSERV@IRLEARN.UCD.IE |
| BIOMATRICE@IRLEARN | BIOSCI Bio-Matrix E-conference Bitnet/Email: LISTSERV@IRLEARN Internet: LISTSERV@IRLEARN.UCD.IE |
| BIOMCH-U@IRLEARN | E-conference for members of the International, European, American, Canadian, and other Societies of Biomechanics, and for others with an interest in the general field of biomechanics and human or animal 'movement science'. For the scope of this e-conference, see, e.g., the Journal of Biomechanics (Pergamon Press), the Journal of Biomechanical Engineering (ASME), and Human Movement Science (North-Holland). Bitnet/Email: LISTSERV@UHARN Internet: LISTSERV@UHARN.BITNET@CUNYVM.CUNY.EDU |
| BIONEWS@IRLEARN | BIOSCI BioNews E-conference Bitnet/Email: LISTSERV@IRLEARN Internet: LISTSERV@IRLEARN.UCD.IE |
| BIOP-L@KSUV.BITNET | Secondary Biology Teacher Enhancement PI LISTSERV@KSUV.BITNET |
| BIOSPH-L@UBVM | Anything relating to the biosphere, pollution, CO-2 effect, ecology, habitats, climate, etc., can be discussed. Bitnet: LISTSERV@UBVM Internet: LISTSERV@UBVM.CC.BUFFALO.EDU |
| BIOTECH@UMDC | The Biotechnology e-conference is open for: Software/hardware issues, announcements, submission of bulletins, and exchange of ideas and data. The server accepts commands from the subject line of a message. Requests for information and previous bulletins can be sent to: BIOSERVE@UMDC.UMD.EDU (Internet) BIOSERVE@UMDC (Bitnet) All requests to be added to or deleted from this e-conference, problems, questions, etc., should be sent to the Coordinator: Archives: Previous bulletins are archived on BIOSERVE server disk. |
| BNFNET | Discussion group for biological nitrogen fixation. All requests to be added to or deleted from this e-conference, problems, questions, etc., should be sent to the coordinator. Send your full name, postal address, and a short description of your work/interest in BNF. |
| BRINE-L@UGA | Brine Shrimp E-conference Bitnet: LISTSERV@UGA Internet: LISTSERV@UGA.CC.UGA.EDU |
| CUMLIST@OHSTYMA | E-conference of climatologists Bitnet: LISTSERV@OHSTYMA Internet: LISTSERV@OHSTYMA.BITNET@VM1.NODAK.EDU |
| DAIRY-L@UMDD | Dairy E-conference. DAIRY-L@UMDD is a discussion medium for professional educators and extension workers advising the dairy industry. Questions concerning problems or policies faced by dairy producers are encouraged, as are requests for educational tools such as visual aids, computer-aided decision support tools, and outlines of educational programs. Bitnet: LISTSERV@UMDD Internet: LISTSERV@UMDD.UMD.EDU |
| EBCSCAT@HDDETUD | Catalogue of 'biotechnological' software. EBCBUL is short for EBC Bulletin Board, a facet of the European Bank of Computer Programs in Biotechnology (EBCB). EBCB is a nonprofit making organization mainly funded by the European Community (EC). The main goal of EBCB is to stimulate and facilitate the use of computers in biotechnological training and research in Europe. EBCBUL will not only promote user/user communication, but will also provide users with up to date information (e.g. about courses/conferences). EBCBUL is public, and anyone with access to EARN can participate. Bitnet/Email: LISTSERV@HDDETUD Internet: LISTSERV@HDDETUD.TUDELFT.NL |
| ECONE@MIAMIU | A discussion of ecological and environmental issues Bitnet: LISTSERV@MIAMIU |
Table 2. (continued)

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<th>The Environmental Studies E-conference. The purpose of this e-conference is to exchange information about Environmental Studies (ES) programs</th>
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<th>Discussion forum for horse fanciers. EQUINE-L is an e-conference for the discussion of all phases of horse ownership, management, use and related concerns for all horse breeds, both hot and cold blood.</th>
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<th>Ethology An unmoderated e-conference for the discussion of animal behavior and behavioral ecology. Possible topics could be e.g. new or controversial theories, new research methods, and equipment. Announcements of books, papers, conferences, new software for behavioral analysis etc., are also encouraged.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitnet: LISTSERV@FINHUTC. Internet: <a href="mailto:LISTSERV@FINHUTC.BITNET">LISTSERV@FINHUTC.BITNET</a>@CUNYVM.CUNY.EDU</td>
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<th>Medicinal and Aromatic Plants discussion list</th>
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<tr>
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<th>E-conference covering topics in computer aided molecular biology and of particular interest to users and managers of the &quot;Genetics Computer Group&quot; software from the University of Wisconsin.</th>
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<tbody>
<tr>
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<th><a href="mailto:MAILSERV@SCU.BITNET">MAILSERV@SCU.BITNET</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Orchid growers Willis Dair (<a href="mailto:DAIR@SCU.BITNET">DAIR@SCU.BITNET</a>) This unmoderated list was created to share and discuss information and experiences of orchid growers.</td>
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<th>POPULATION-BIOLOGY Population Biology is a synthesis of population ecology and population genetics, pursuing a unified theory to explain the structure, functioning and evolution of populations of living beings. Such populations are very complex systems, exhibiting a variety of phenomena that we still do not master. Just to quote a famous example, multianual density cycles (e.g. in lemmings) have not received a satisfactory explanation, despite of decades of debated studies and speculations. Population Biology is a very active field, encompassing such diverse approaches as tenacious, harsh field work to track long-term demographic and genetic fluctuations, or sophisticated conversations with a computer about strange attractors possibly causing chaos in the density fluctuations.</th>
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<td>The BITNET and USENET names of the new group are: Internet BITNET</td>
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If you wish to participate in the group, please send your subscription request to the appropriate BIOSCI node below. More information on BIOSCI can also be requested at the addresses below: biosci@net.bio.net.bionet@vm1.nodak.edu Internet biosci@net.bio.net.BiNet |

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<th>BIOSCI: Science-Resources E-conference</th>
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<th>Veterinary Medicine Computer Assisted Instruction</th>
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**Table 3.**

**Resources Accessible on Internet, Using Telnet for Remote Log-In**

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<tr>
<th>Description</th>
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<tr>
<td>Penn State University PEN Pages</td>
<td>telnet: psupen.psu.edu login with 2 letter state code</td>
</tr>
<tr>
<td>Information on all aspects of rural life.</td>
<td></td>
</tr>
<tr>
<td>National Science Foundation - Science and Technology Information System</td>
<td>telnet: sisis.nsf.gov login as public</td>
</tr>
<tr>
<td>California State University at Fresno - Advanced Technology Information Network</td>
<td>telnet: caticsf.csufresno.edu login as super</td>
</tr>
<tr>
<td>Agricultural information service providing information on markets, news, weather and other events impacting agriculture.</td>
<td></td>
</tr>
<tr>
<td>Federal Information Exchange - FEDIX</td>
<td>telnet: fedix.fie.com login as fedix</td>
</tr>
<tr>
<td>Provides on-line information on federal programs offered by the government that may be of interest to colleges and universities.</td>
<td></td>
</tr>
<tr>
<td>Weather Underground</td>
<td></td>
</tr>
<tr>
<td>Weather information provided by the U.S. Weather Service.</td>
<td></td>
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<tr>
<td>telnet: maclab.spire.umich.edu 3000</td>
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Distance Education for the '90s and Beyond

Valorie F. McAlpin
Director of Agricultural Communications
North Carolina A&T State University

Introduction

I'd like to thank the conference organizers, Dr. McKinnie, and others for allowing me this opportunity to discuss a topic that I feel will ultimately change the way Extension and universities will do business in the twenty-first century. Thanks to Janet Foley, director of Communications, Information, and Technology for the Extension Service-USDA, I have been fortunate enough to have worked on several national committees dealing with information technology, and, more recently, with distance education.

There are two committees within the National Association of State Universities and Land-Grant Colleges (NASULGC) addressing distance education. One, headed by Sam Smith of Washington State, is a presidents-only group. Their focus appears to be on affecting legislation and funding. A second committee, of which I am a member, is headed by Bill Sibby of the University of Alabama, and our focus is system-wide strategic planning: building networks, sharing information and technology, recommendations on hardware and software, etc.

I am also a member of the Extension Service distance education committee, which is an outgrowth of the Future Applications of Communications Technology (FACT) committee. Very soon, this committee will be presenting a list of recommendations for the Extension Service that should help facilitate a systems approach to distance education. (States will be encouraged to share resources rather than reinvent the wheel. Extension will attempt to identify priorities in distance education and develop resources accordingly.)

Why is Distance Education Such a Hot Commodity?

I feel that the 1890s are strategically poised to become major players in the whole area of distance education. I’ll explain more about this as I go along, but first let's talk about distance education. What is it? If you will, please take a moment to write down what you think is distance education. Just a sentence or phrase will do. I’ll give you a hint. Distance education is a young discipline and as such is still evolving. So there are no wrong answers per se.

Let me begin by explaining what distance education is not. It is not the dissemination of information, it is not a one-way transfer. Distance education involves interaction between teacher and students, or among students in study groups. Within Extension, it involves a learning process between and among clients and agents, or specialists. Distance education is not satellite videoconferencing, nor is it tied to any specific medium. Distance education might include correspondence courses, audio teleconferencing, satellite videoconferencing, use of compressed video networks with electronic mail, two-way video interaction with a microwave system, or simply the use of videos or audiocassettes, supplemented by printed materials.

My point is that distance education is simply EDUCATION at a distance. Any or all the aforementioned communications technologies may be used, depending on the audience or students you're trying to reach and the content being delivered. Unlike traditional face-to-face education, with distance education you may not be able to see all of your students at one time, therefore your instructional design will have to be different. Most successful distance learning organizations, such as the British Open Learning...
Network or Canada’s Athabasca University, use a team approach in developing programs and courses for clients or students at a distance. The team consists of the author or technical expert, instructional designer, and a communications specialist who may be a writer or producer.

Distance education is characterized by: openness, equal access, flexibility, dynamism, portability, non-linear transfer, multi-sensory delivery modes, and responsiveness to practical needs. What I’ve described here is an educational system designed for adults who have jobs and families and limited free time, but need additional education to compete in today’s marketplace. They don’t have time to come to our universities to take a course, but they can use their computers and VCRs to study when they can fit it into their busy lifestyles. They want timely information, they want relevant information, and they want it now. With the proliferation of information available today, if our clients or students can’t get what they need from us when they need it, you can believe they’ll get it elsewhere.

Why is distance education such a hot commodity right now? On the international front, many countries see distance education as a great social equalizer — a way to provide cost effective education to the masses, many of whom were not allowed the privilege of education until now. Many Americans realize that education from 6-18 is no longer adequate for today’s world, hence the concept of lifelong learning. In my experience with the national committees, I’ve heard the importance of becoming more accessible to more diverse audiences, and the necessity for more responsiveness to rapidly changing needs stressed over and over again. Distance education is viewed as the number one way to reach more people, more cost effectively, more quickly and with more information based on research and practical needs identified by clients.

Current issues in distance education

The number one concern among staff here at North Carolina A&T when I discuss distance education is the lack of technology by end-users. This is a very valid concern. Are we unintentionally adding to the widening gap between the information haves and have-nots? But on the other hand we do see VCRs among our clientele and we see youth with computers. And once fiber optics become more available we’ll see technology within the grasp of everyone with a telephone and a television.

Another issue surrounding distance education is the lack of supporting university infrastructure. Current research indicates that many universities view distance education with indifference; they view it as peripheral to the real mission of the university. Consequently, tenure rules are not applicable for faculty designing distance education courses. Nor are university rules regarding FTE’s, copyrights for intellectual property, etc. applicable. Many of these concerns are currently being examined and recommendations are forthcoming.

An issue with special relevance for Extension is the need for system-wide planning and sharing of resources. The Extension Service has got to stop reinventing the wheel. There is a need for states to identify issues and work collaboratively on identified issues, then share these resources throughout the system. Perhaps the greatest issue is the need to become learner-focused, rather than teacher-focused, and what this means for faculty or specialists designing courses.

Where are we with distance education at North Carolina A&T and what’s in it for you?

I’ll start with a few highlights of the North Carolina A&T School of Agriculture’s activities in the field of distance education.

A&T was one of the 27 charter members of AG*Sat, a national satellite network now linking 46 land-grant universities and two USDA agencies. The system includes an estimated 1,500 satellite receive sites on university campuses and Extension centers, and in the three years since AG*Sat was initiated its programming schedule has included more than 200 Extension teleconferences and 20 credit courses.

A 15-foot satellite dish is soon to be installed on the roof of the A&T School of Agriculture’s B. C. Webb Hall, and satellite uplinking capability will allow the university to offer telecourses, recertification programs for professionals, undergraduate and graduate-level academic courses, and extension programs to audiences across the United States. It shouldn’t be too long before this dish is used to send programming originating at
A&T around the world.

Links have been established between the A&T School of Agriculture and the University of Fort Hare, an historically black university in South Africa which has produced such distinguished graduates as Nelson Mandela. Fort Hare is establishing a master's degree program in agricultural economics, which will rely extensively on course offerings originating from the A&T campus in Greensboro. A&T's new videotaping facilities and an international e-mail connection will make it possible for students at Fort Hare to take courses from North Carolina A&T — beginning in February, 1994. A&T thus joins Rutgers, the University of California at Berkeley and the University of Michigan in piloting higher education linkages between the U.S. and South Africa.

We have a three-day retreat, designed to introduce the School of Agriculture faculty to instructional design for distance education courses, now in the planning stages. Tentative plans are to conduct this retreat in late summer, before faculty members are preoccupied with the start of the academic year, and in addition to serving as platform for discussion of educational theory and teaching philosophy, the retreat will also serve to acquaint the faculty with new and forthcoming resources. Topping the list of resources is a video production studio in the C. H. Moore Agricultural Research Facility, which will be ready for use this fall.

What impact will the North Carolina A&T School of Agriculture's growth in distance education have on research and extension at other 1890s? I don't think we have to look any farther than this conference for the answer to that question. As one of the larger 1890s and one that has enjoyed a mutually beneficial relationship with the sister 1862 land-grant in its state, North Carolina A&T has frequently been called on to serve as a bridge. We've helped bridge gaps between the 1890 community and USDA, between 1890s and the 1860s, and, right as we speak, between research and extension. I truly believe that I'm speaking on behalf of the entire A&T School of Agriculture faculty and staff when I say that in all our endeavors in the field of distance education we look at the experience and technology we are gaining as a resource not only for A&T, but for the entire 1890 community.
Ways to Grow — Putting Profitability in Small-Scale Agriculture in North Carolina with Alternative Crops

M. Ray McKinnie
Extension/Research Animal Science Specialist
North Carolina A&T State University

The Ways to Grow program has been one of North Carolina A&T Extension's major outreaches to small-scale farmers. Our goal is to help North Carolina's small farmers increase farm profitability, and the means to this goal is alternative agriculture — the introduction of specialty crops and innovative farm-based enterprises which are small-scale producers' hope for the future, in view of the competitive disadvantages they face if they go head-to-head with large, commercial farms.

Ways to Grow has successfully employed four strategies to bring alternative agriculture to small-scale producers in North Carolina:

1. Training

Small-scale producers throughout the state were invited to submit proposals for on-farm demonstrations of alternative enterprises, and those selected (25 in both 1991 and 1992) came to Greensboro for a 2 1/2 day Small Farm Institute. With each farmer came a member of the Extension staff from their county who had agreed to serve as a mentor for the demonstration project. The farmers and Extension personnel participated in highly interactive training with production and marketing specialists. They received advice on finances and recordkeeping from authorities, and they heard the firsthand experiences of other farmers already involved in alternative enterprises.

II. A technologically advanced information delivery system

The kickoff for Ways to Grow was an hour-and-a-half satellite videoconference — the uplink a first not only for A&T Extension but for the entire university. A panel consisting of small farm experts from Cornell, the University of California, Successful Farming magazine, the North Carolina governor's office and North Carolina A&T discussed the systematic adoption of agricultural enterprises, and responded to questions from viewers throughout North America.

Two new videos were introduced at both the 1991 and 1992 Small Farm Institutes. "Ways to Grow" a promotional video which explains the program, its audience, and project objectives was introduced at the 1991 Small Farm Institute, along with "Know Your Market First," an educational video emphasizing the importance of preceding actual production with preliminary market research. The new videos released at the 1992 Small Farm Institute were "Sweet Basil: The Culinary Connection," and "Direct Marketing For Small Farmers." Like most of the other 10 videos in the Ways to Grow series, the two newest releases are concise, introductory overviews, designed to help small-scale producers decide if they have the interest, time and resources to launch an alternative enterprise.

III. Applied research

Each of the demonstration farms served as a collection point for an array of data. From this data, new information has been gained on the adaptability of alternative enterprises to the state's geographic regions, disease and insect control, the applicability of cultural practices, market demand, profit potential and many other topics.

IV. Networking

The Ways to Grow project has united government agencies and nonprofit groups working to assist small-scale producers. Project
directors have worked closely with the North Carolina Food and Agricultural Council (FAC) which is composed of the state-level heads of all USDA agencies. Ways to Grow networking has also brought together members of the NC Department of Agriculture's marketing division, the North Carolina Farm Stewardship Association, and top-level Extension administrators from North Carolina State University and North Carolina A&T.

Conclusion

Ways to Grow has become both an information resource and a communications conduit for small-scale farmers and agencies working to assist them. The Small Farm Institute functions as an information flow paradigm, with data and knowledge going directly from authorities to farmers and county Extension personnel. As a model for successful information flow, the Small Farm Institute has corollary recognition as a clearinghouse and communications channel for information related to alternative enterprises. The Ways to Grow videotape series has been honored with an Award of Excellence by ACE (Agricultural Communicators in Education), an international organization of communications professionals in agricultural, environmental and food sciences.

But perhaps the most significant accomplishment for Ways to Grow in the past two years comes in the public awareness arena. The program has generated tremendous interest. News coverage has been extensive: Ways to Grow has been the subject of more than 30 articles in 25 different daily and weekly newspapers. Project directors have had personal contact with individuals and agencies throughout the state, and these contacts have resulted in greater understanding of the program's intentions and support for its goals. Ways to Grow has greatly increased public awareness of the sociological and economic adversity confronting small-scale agriculture. Ways to Grow has also brought to public attention implications for the future which clearly illustrate the need for revitalizing small-scale agriculture, and the necessity of public support for programs aimed at revitalization. The program's success in rallying public support for revitalization efforts is in no small measure due to its comprehensive nature. With its commitment to alternative agriculture, Ways to Grow serves to offer a solution to the issues it brings to light.
The Sustainable Agriculture Question in its Social and Economic Context: Community

Shirley Callaway
NC A&T Cooperative Extension Specialist

We in the 1890 community are here to grapple with the question of agricultural sustainability. I know that at present the concept focuses on two issues: that we are not mining the long-run health of the environment for short-run gain and at the same time that economic well-being (profitability) of agricultural producers be maintained. I hope that you will incorporate into your approach a certain number of points which have been brought home to the A&T Community Voices State Training Team as we field tested our leadership development project, Community Voices, over the past several years. As you hear about these experiences and as you as agricultural researchers and extension specialists focus on your perceptions, you will perhaps see why I have been invited here to talk with you. After all, it probably is not obvious — especially to any of you who have been focusing on traditional, production improvement research — why leadership development has been included on the agenda.

Over the past four years, we field-tested our program in four states (Alabama, Arkansas, Texas and North Carolina) in order to develop the curriculum and procedures to promote leadership and community involvement in the 1890 target audience — the limited-resource audience. In the process the rural community dwellers we worked with through local Extension offices developed a vision of their present and future community. They shared that vision with each other to make it a community vision, and in the process shared it with us. We have many of the visions in my office on videotape.

The vision statements and discussions of community vision are very striking. On one hand the needs identified by the audience nearly always started with economic development, or “jobs!” as they frequently stated it. On the other hand, agriculture was generally not included in their vision of their community now, or in the future.

Think of it. Think of a vision of the rural South in which agriculture is not seen as part of the neighborhood. Or envision food and fiber production which is somehow outside the domain of the social system it is feeding and clothing. Again, think of this in terms of our educational audience. Think of these points in terms of the definition of sustainable agriculture and the future of the land-grant system. You begin to see the seriousness of the situation for the audience, for ourselves and for the 1890 institutions.

Have our agricultural policies so divorced production agriculture from its social context that a sustainable question cannot include this audience, our future students and our communities? Is there justification to see environmental politics as further eroding their ability to participate in the process of sustainability? After all, in terms of minority land ownership, production and marketing and communities and then small farm participation, are we anywhere else than endgame?

Have our efforts to convince American farmers their community is global succeeded so well that to them Brazilian and Zimbabwean farmers are “competitors?” Has our production system so distanced itself from “effective place” that it is not seen as part of the social context in which the production and marketing are initiated? Why are we worrying about sustainability if that’s the case? I hope you might accept other answers than a shrug of the shoulders, an “it’s inevitable” type answer, because if you don’t see the problem from the point of view of these, our stakeholder friends, then this discussion is largely academic and only self-serving.

To my way of thinking the core aspect of
“sustainability” is the informed decision making of participants, looking at systems and long-run issues rather than in unconnected problem-solving. At this point then, the importance of a program like Community Voices becomes clear in the “sustainability” context. It becomes, if you will, the flip side of Farming Systems Research (FSR/E).

FSR/E is a vehicle which permits the researchers to become immersed in a domain and view it from a variety of scientific perspectives. Indeed, these create the research domain by their inclusion of factors within a specific ecological context. That approach allows a team of researchers to examine a production system in an ecological system.

Community Voices is a vehicle which permits the stakeholders to articulate a vision and participate in the creation of that vision. As an educational vehicle it allows for expanded horizons by offering researchers and extension personnel ways of publicly examining jobs, production agriculture, and place, neighborhood or community in dialogue with the stakeholders in rural communities. The fit of these two approaches brings both participatory perspectives to bear on the one question so that sustainability is not just accurately defined but is acted upon. How could we expect to proceed in our involvement in sustainable agriculture in any other way?

Community Voices was a multi-state pilot effort funded by a grant from the W. K. Kellogg Foundation. The field test phase is now completed and materials are being produced which can be used by the audience to help them develop their vision and the skills to make that vision a reality. Other materials have been developed to assist Extension or other agents to put the program out to the audience and insure that it works — a process we call managing, mentoring and monitoring.

The value to you of considering a leadership development program today is not the added complexity of the definition of sustainability or anything along that line. It is to make it an action. Moving from the campus or laboratory or even a conference can be termed the process of praxis. Praxis is putting a concept into practice and conceptualizing the practices as a constant dialogue. It is the most challenging and also the most meaningful aspect of conceptualization of a term like “sustainable.” It is a real possibility with a program such as Community Voices. This is the community referred to in the title of this paper — a community of rural dwellers and 1890 personnel working together to make agriculture sustainable — with land stewardship and ownership not declining but viable in economically viable communities where the quality of life is commensurate with human needs and aspirations.
Virginia State University's Randolph Farm: A Conduit for Rural Problem Solving

Mitchell Patterson Jr.
Agriculture Extension Specialist & Farm Superintendent
Virginia State University

Virginia State University, located in historic Petersburg, is one of two state land-grant institutions whose overall mission is to promote and sustain programs which address major issues and problems affecting urban and rural audiences.

Realizing the potential to influence positive change in the Virginia agriculture industry, Virginia State University began in 1986 to revitalize its University Farm into a Center for Agricultural Diversification. A task force report on the Future of Virginia Agriculture, prepared in 1985, concluded that Virginia agriculture was too heavily dependent on traditional crops of corn, soybean and tobacco to sustain the industry in the future. There was a need to diversify by producing new crops and establishing environmentally sound production systems that would increase profitability, yet limiting risks.

The 416-acre research and demonstration farm which was previously limited to plant research work has been refocused to develop and refine non-traditional agricultural enterprises and production systems that maximize farm profits without adversely affecting the environment.

Randolph Farm is comprised of traditional Agricultural Departments: the Agriculture Research Station, Cooperative Extension Service, and the newly established Center for Plants and Water Quality. Departmental funding for projects is on an individual basis, with program coordination and support coming from the farm superintendent’s office and field staff. Additional support comes from formal and informal agreements with agencies such as the Soil Conservation Service, the Division of Soil and Water, the Virginia Department of Forestry, and the Virginia Department of Game and Inland Fisheries.

Since 1986, Randolph Farm has become recognized as the premier center for the evaluation of new crops and production systems in the middle Atlantic region. This presentation highlights the program areas emphasized.

Key research and demonstration projects include: aquaculture (with 57 ponds featuring hybrid striped bass and catfish, and a hatchery for fingerling production); an hydroponic greenhouse (vegetable production without soil); alternative crops (Belgian endive, garlic, everlasting flowers, shiitake mushrooms, herbs); small fruits (blackberries and grapes); high density apple production; limited space and limited mobility gardening; low-input and biological production systems; soil conservation and water quality efforts; air pollution (ozone) effects on beans; integrated pest management soybeans; and meat and fiber goat research studies.

Randolph Farm’s research and demonstration efforts have attracted more than 5,000 visitors to the center on an annual basis during the past three years. The results of Randolph Farm’s demonstration and research efforts are disseminated to farmers and other interested persons throughout the year through planned tours, seminars and field days. The impact of these educational strategies includes an increased awareness and adoption of new crops and livestock enterprises, and production systems.

Through Randolph Farm, over 3,000 high school and elementary school students have increased their awareness of natural resource management systems, and more than 2,000 farmers and agricultural professionals have gained knowledge in adopting new technology, or to transfer new technology to others.

Two major field days are held each year. The aquaculture and crop field days are annually attended by 800 producers and agricultural professionals from the Mid-Atlantic states. Publications are continually being developed to support this educational effort.

As new knowledge is generated, Randolph Farm will continue to expand its research and demonstration capabilities to meet the needs of its clientele.
Recommendations concerning implementation of Sustainable Agriculture Programs in the 1890 (and Tuskegee) Community.

Prepared by the ad-hoc task force (see item one in the specific recommendations section to follow) established by the Extension specialists, researchers and administrators of 1890 Agricultural Programs, who met in Greensboro, North Carolina, March 21-24, 1993, to discuss the issues of sustainability under the leadership of D. D. Godfrey, Associate Dean and Administrator of Extension at North Carolina A&T State University, who obtained funds from the Southern Rural Development Center (SRDC) for this purpose.

General Statements

The sustainable agriculture question provides an opportunity for the 1890 community to reassess its traditional extension and educational orientation in an area which has emerged as a topic of great environmental and economic importance. However, the 1890 community must be willing to make some changes and offer public leadership in order to achieve the desired preeminence. Review of the focus of ongoing "traditional" research, mission statements focus, and effective networking will permit greater opportunity to approach SARE (Sustainable Agriculture Research and Education) and other sources of funds for sustainable agriculture efforts. International aspects should continue to be included in the process.

The sustainable agriculture question is accepted in terms of the 1990 Farm Bill definition, but with special emphasis on the development of alternative enterprises for small-scale and limited-resource farmers living in disadvantaged communities across the South. Special attention is due inter-generational transfer of land — especially by minority farmers — and the research and extension efforts needed to address this question.

Many people in the 1890 community, on-campus and out in rural communities, may have a negative perception of sustainable agriculture. This is similar to the problems 1862 Land-Grants have encountered in their work to promote "systems" approaches; a confusion about the presence of "values" in recommendations (as though "values" are not there now) and problems in face of change (implied criticism of present activities), as well as the fear that environmental questions will be resolved in ways detrimental to the rural and minority populations, and small-scale agriculture. These concerns can be addressed so that the entire 1890 community becomes active in the process: generating and working toward a shared vision.

Specific Recommendations*

1. A task force was proposed and established to provide continuing leadership in this area. The task force was constituted as follows: Ray McKinnie, (North Carolina A&T State University), Deyремple Marsh (Lincoln University), Chandra Reddy (Alabama A&M University), Errol Rhoden (Tuskegee University), Cassel Gardner (Florida A&M University), Mark Davis (Delaware State College), and John O'Sullivan (North Carolina A&T State University).

2. Rodale Research Institute, represented by the Rhonda Janke, director of Research, has indicated an interest in exploring the possibility of establishing a Southern Regional Sustain-

* Summarized from discussions and reports of the three sub committees of the conference.
able Agriculture On-Farm Research and Out-
Reach Coordinator Position in collaboration
with the 1890 community. Rodale would be
willing to fund 50 percent of such a position.
This offer should be explored further with
Rodale Institute.

3. All the 1890 institutions should put a specified
sum of money into a common pot to fund
sustainable agriculture research and extension
efforts, and to build a base of internal interest
in sustainable agriculture. This would build
interest on our own base and maintain commit-
ment. This would put CSR5 funds at the
disposal of this research topic at a time when
other sources of funds are not yet available.
They would build the starting points for
credibility in the race for competitive grants.

4. The 1890 community should actively promote
an inter-disciplinary farming systems re-
search/extension (FSR/E) approach to sustain-
able agriculture. This could be done by re-
warding active participation in the Association
of FSR/E, and publication in their journal and
the *Journal of Alternative Agriculture*, collabora-
tion with Rodale (with publication through
them) and other researchers interested in
sustainable agriculture questions. Continued
involvement in international work and liaisons
with international development efforts can be
integrated here. Joint appointments in research
and extension might facilitate this point.

5. Each campus should increase the visibility and
prominence of its “Center of Excellence”
through the renewed and creative use of the
1890 farms for promotion of sustainable
agriculture research, demonstrations and
publicity about the programs — through field
days and teaching programs. This would build
in the direction already begun by Virginia State
University.

6. The sustainable agriculture question should be
brought more broadly into the curriculum at
the 1890 campuses. This includes discussion of
the best routes to include the topic in class
work, use of the Rodale Intern program to
develop student interest and involvement, and
other mechanisms.

7. Network our 1890 communications and out-
reaches through new technologies, so as to
facilitate publication of research, reach the
desired audiences and network with the many
other groups and agencies involved in this
domain. This is an area in which international
connections can be developed.

8. Encourage more farmer and advocacy group
participation (setting agendas, implementing
efforts, and reviewing outcomes) in the devel-
opment of programs, research agendas and
educational priorities. This can be accom-
plished through field days and interactive
public outreach forums, as well as traditional
extension outreach efforts.

9. The extension system of the 1890s is set up
according to federal guidelines and memoran-
dums-of-understanding with the 1862 Land-
Grants in their states. At least 50 percent of the
research on the 1890 campuses should be
directly linked to small and limited-resource
audiences, and identifiable as useful by those
audiences. The research should see and
interact with that audience in its social and
economic context.
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The SRDC is one of four regional rural development centers in the nation. It coordinates cooperation between the Research (Experiment Station) and Extension (Cooperative Extension Service) staffs at land-grant institutions in the South to provide technical consultation, research, training, and evaluation services for rural development. For more information about SRDC activities and publications, write to the Director.

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