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AN EVALUATION OF SOUTHERN REGION SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION (SARE) PROGRAM PROPOSALS FOR THE PERIOD 1992-1994

A Dissertation

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy in The School of Vocational Education

by
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December, 1994
FOREWORD

"Those who don't read good books have no advantage over those who can't."

Mark Twain
The author would like to express a deep feeling of appreciation and thanks to all who gave him encouragement and guidance throughout the graduate program. The author is most appreciative to Dr. Barbara A. Holt, major professor and doctoral advisory committee chair, for her encouragement, patience, time, concern and valued guidance. Appreciation is extended to Drs. Michael Burnett, Ed Holton, and Charles Teddlie for their time and guidance in research. Special acknowledgement is given to Mr. John Freeman and Dr. William Brown for their support, helpfulness, and encouragement.

A heartfelt thought goes to Drs. Lydia Ori and Walter Wiles for their helpfulness, support, time, guidance, great words of encouragement, and, above all, for instilling in me the real meaning of determination. Sincere gratitude to Dr. Vincent Kuetemeyer, Dr. Satish Verma, and Dr. Jane Luzar for their guidance and patience throughout this study.

Acknowledge is extended to Ms. Myrtle Smittie Bolner, Ms. Colleen Wiseman, Ms. Barbara Ssenkoloto, and Ms. Gail Lungaro for their helpfulness. Special recognition is given to Dr. Betty Harrison for her genuine concern and helpfulness and Sandra Cash for her services and guidance during the course of the study. Special thanks to
Chancellor H. Rouse Caffey and Dr. William H. Patrick, Jr. for their financial support.

Deepest gratitude is expressed to the author's wife, Mrs. Kaari M. Njoka, for giving him time off to pursue one of their most cherished dreams. Her love, support, concern, encouragement, prayers, and good understanding are beyond reproach throughout this study. The author wishes to extend his acknowledgements to his daughter Kathomi, and sons Munene, Mwenda, and Mwiti for allowing him to be away from them when they needed his love and guidance the most.

Last but not least, heartfelt gratitude is expressed to the author's mother, Mrs. Peris Ciang'ombe Njoka, for her unconditional love. His mother has taught him the true meaning of perseverance and endurance, and to her he dedicates this dissertation.
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ABSTRACT

The purpose of this study was to describe and compare funded and unfunded research proposals submitted to the Southern Region Sustainable Agriculture Research and Education Council between 1992 and 1994. Coding reliability and validity were assessed through a pilot study after which the actual coding was carried out. A census of 32 funded and a simple random sample of 54 unfunded proposals were used for this study.

Descriptive statistics (frequencies) were used to describe research themes, sustainable agricultural practices, research categories, funds requested for research, origin of proposals, length of research period, research cooperators, and the occupation of principal investigators.

The results of the study showed that the investigators placed emphasis on several variables deemed important in the promotion of sustainable agriculture in the Southern Region. The theme of animal systems research was most emphasized, while the variable, cropping practice, had the highest frequency among the sustainable agricultural practices. Integrated and experimental research categories together had the highest frequencies among the funded proposals.
Arkansas received the highest number of proposals funded, and most funded proposals took three years. Many funded proposals were written by four or more cooperators. Professors represented the occupation with the most funding, followed by practitioners.

Integrated research was shown to be very important in this study. Integration of animal and cropping systems was considered as an important farming practice in the promotion of sustainable agriculture in the southern United States. A multi-disciplinary approach where different professionals cooperated to do research was emphasized by many researchers in this study.
CHAPTER I
INTRODUCTION

The premise of this study was to employ the ensuing conceptual framework in the content analysis of research proposals submitted to the Southern Region Sustainable Agriculture Research and Education (SARE) Council for funding. The aim was to describe and compare funded and unfunded sustainable agriculture research proposals submitted to the Council for the period 1992 to 1994.

Descriptions and comparisons were based on the variables: research themes, sustainable agriculture practices, research categories, and the funds required for research. In addition, origin of the proposals, length of research period, research budget, number of research cooperators, and the occupations of the principal investigators also were considered for description and comparison. This research-based agricultural production information would enlighten researchers on the current status of sustainable agriculture research in the Southern Region. This information would help the SARE Council and investigators to develop suitable technologies. These technologies would promote economic growth through effective competition for global market by producing goods and services that are safe for human consumption. This type of knowledge also would encourage conservation of
natural resources and good adherence to the basic principles of sustainable agriculture.

There is no general consensus on what constitutes sustainable agriculture. The United States Department of Agriculture (USDA, 1991) defined sustainable agriculture as "farming in ways that protect the environment, conserve resources, and assure food safety as well as provide farmers with adequate net returns." According to the National Research Council (1991), a comprehensive definition of sustainable agriculture must include physical, biological, and socioeconomic components. The Council argues that sustainable agriculture is a goal rather than a distinct set of practices; that is, a system of food and fiber production that improves the underlying productivity of natural resources and cropping systems so that farmers can meet increasing levels of demand in concert with population and economic growth, and produces food that is safe, wholesome and nutritious. Sustainable agriculture should be able to promote human well-being, support an adequate farm income, and provide an acceptable standard of living for farmers while underwriting the annual investments needed to improve progressively the productivity of soil, water, and other resources. It also should comply with community norms.

Francis, Flora, and King (1990) and the American Society of Agronomy (1989) defined sustainable agriculture
as "the long term agricultural production that (1) enhances environmental quality and the resource base on which agriculture depends, (2) provides for basic human food and fiber needs, (3) is economically viable, and (4) enhances the quality of life for farmers and society." In 1988, the United States Agency for International Development (USAID) defined sustainable agriculture as "the ability of an agricultural system to meet evolving human needs without destroying the environment, and, if possible, by improving the natural resources on which it depends" (Francis et al., 1990, p. 5). In 1988, the International Service for National Agricultural Research (ISNAR) defined sustainable agriculture as alternative, generative, low-input, ecological, environmentally sound, and also organic agriculture. ISNAR’s perception is primarily that of alternate systems of farming that will feed expanding populations while minimizing potential negative effects (Francis et al., 1990, pp. 425-436).

Harwood (1990) described sustainable agriculture as "an agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use, and balance with the environment that is favorable both to humans and to most other species." According to Lockeretze (1983), sustainable agriculture is the ability to endure indefinitely, perhaps with appropriate evolution. The advocates of organic farming characterize sustainable
agriculture as the use of no synthetic inputs in production; while farmers use the term "farm family" to mean production or marketing methods coupled with agricultural policies that preserve the single family agricultural industry (Ori, 1992).

For the purpose of this study, sustainable agriculture was defined as "farming in ways that are economically viable, socially acceptable, and environmentally sound." This definition draws from the description developed by USDA (1991).

The concept of sustainability in agriculture is dynamic, novel, nebulous, and regionally specific. Sustainability means different things to different people. In the Southern United States researchers are constantly striving to identify sustainable agricultural practices that are unique to southern agriculture. To achieve this goal, the land grant universities, private firms, and many private and public institutions are encouraged to develop and promote sustainable agricultural practices through a joint effort between the USDA and the Environmental Protection Agency (EPA).

Research on sustainable agriculture practices is supported by many other agencies, among which Agricultural Research Services (ARS) is the largest in the world. Currently, ARS is spending over $74 million of its research budget on essential components of sustainable agriculture
The Cooperative State Research Service (CSRS) has a long history of partnership with State Agricultural Experiment Stations in providing farming systems research results to American farmers that meet their site-specific needs in all the states and territories. The CSRS administers federal funds in the development of such technologies as intercropping, manure management, soil testing, biological and cultural methods of pest control, and integrated pest management.

In view of this vital role, Congress selected CSRS as the lead agency to administer funds appropriated under the Agricultural Productivity Research Act, Subtitle C, Title XIV, of the 1985 Food Security Act. The USDA (1991) named this program Low Input Sustainable Agriculture (LISA). In the same year, the name was changed from LISA to SARE, reflecting the broader mission to strengthen "family farms" and rural communities. Beginning in 1991, the EPA collaborated with the USDA in a joint funding program entitled, "Agriculture in Concert with Environment" (ACE) (Southern Region SARE Annual Report, 1992).

In the United States, the SARE program is managed by four Regional Administrative Councils whose primary goal is to promote sustainable agricultural practices. These regions include the Northeast, South, North Central, and West United States (USDA, 1991).
The sustainable agriculture program in the Southern Region embraces Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, and the Virgin Islands (USDA, 1991). The LISA program began funding research and education in 1988. In addition, the 15 states which constitute the Southern Region have large annual budgets set aside to promote sustainable agriculture through research projects and training of extension personnel (National Cooperative Extension Service, 1992).

From 1988 to 1992, the Southern Region sustainable agriculture program was able to carry out over 50 fully funded projects on varying sustainable agriculture topics (Southern Region SARE Project, 1993). The annual funding cycle begins with a call for proposals by the regional administrative council. These proposals must be submitted in June, and final selection for funding is made in late January. Proposals are invited from individuals and/or teams of farmers, university research and educational staff, representatives of private groups, and public agency staff.

According to the National SARE Report No. 92-13 (May, 1992), about half of the proposals received for funding did not meet the criteria set for funding by the regional councils (SARE, National Overview, 1992). This inadequacy
may be attributed to lack of information on sustainable agricultural production practices and novelty of available sustainable agricultural production technologies. Results of the analysis of the current programs should aid in redirecting agriculture toward more sustainable practices, thus satisfying the USDA and EPA requirements. A formative review of the USDA and EPA performance through content analysis of research proposals is an integral part of a dynamic program.

The central idea in content analysis is that many words of the text are classified into much fewer content categories (Weber, 1990). To make valid inferences from the text, it is important that the classification procedure be reliable in the sense of being consistent. Different people should code the same text in the same way, and the classification procedure must generate variables that are valid. Weber (1990) said that a variable is valid to the extent that it measures or represents what the investigator intends it to measure (i.e., the construct the investigator intends to measure).

Problem Statement

The fundamental principles embracing sustainable agriculture are global, but sustainable practices vary and may be regionally specific. There is limited information
on sustainable agricultural production practices, and conventional farming practices have been blamed for not being sustainable. For the Southern Region of the United States, raising agricultural products like cotton, rice, dairy, beef, poultry, and pigs with inputs such as commercial fertilizers and pesticides requires producers to employ environmentally sound production practices that supply goods and services that are safe and healthy.

It was, therefore, considered important to study the funded and unfunded proposals submitted to the Southern Region SARE Council for funding. This analysis would identify sustainable agricultural production practices most emphasized by researchers as a means to redistribute resources to deserving research problems.

Identification of priority sustainable agriculture practices would help to redirect agricultural research toward more sustainable practices. An evaluation of the Southern Region SARE program may aid in characterizing practices considered important to sustainable agriculture, thus, aid in designing ways to promote them.

Justification

Since the inception of the LISA program in 1988, evaluation of SARE research proposals has been left to individual technical committee members as stipulated in the
Cooperative State Research Service (1991). This arrangement merits some modification in order to select deserving proposals, because the USDA guidelines for evaluating proposals are subjective and open to varying interpretations. This approach needed streamlining by providing examples, establishing the current status of the program through rigorous content analysis of the proposals and readjusting the program accordingly. The information gathered could be a prime asset in the promotion of sustainable agriculture proposals. A distinctive feature of this research is its focus on identification of specific agricultural production practices that researchers propose to support sustainable agriculture in the Southern Region of the United States.

Specifically, a careful scrutiny and analysis of the Southern Region SARE funded proposals in this study revealed the extent to which the proposals satisfy the basic tenets of sustainable agriculture (social, economic, and environmental parameters). These findings may aid in redesigning research to include practices which avoid or minimize waste of resources by devoting resources to priority sustainable projects.
Purpose and Objectives

The primary purpose of this study was to compare the content of funded and unfunded Southern Region SARE program proposals submitted in 1992, 1993 and 1994. The proposal contents were evaluated on the basis of the emphasis they placed on sustainable agricultural production practices that emanated from the texts of the proposals. The measurement parameters (frequency of practices) were derived from the QUALPRO (a text database and production tool for qualitative data presentation and analysis) output as generated from the text and cross referenced with information from a literature review and the agricultural production evaluation practices provided by Sustainable Agriculture Operation Committee (1991).

The following objectives guided the researcher in the study:

1. Describe funded proposals based on the following characteristics:
   a. Research content themes
   b. Occupation of principal investigator
   c. Emphasized research categories
   d. Sustainable agricultural practices
   e. Amount of funds
   f. Research location
   g. Number of cooperators
2. Describe unfunded proposals based on the following characteristics:
   a. Research content themes  
   b. Occupation of principal investigator  
   c. Emphasized research categories  
   d. Sustainable agricultural practices  
   e. Amount of funds  
   f. Research origin  
   g. Number of cooperators  
   i. Research period  

3. Compared funded and unfunded proposals based on the following selected characteristics:
   a. Research content themes  
   b. Occupation of principal investigator  
   c. Emphasized research categories  
   d. Sustainable agricultural practices  
   e. Amount of funds  
   f. Research Origin  
   g. Number of cooperators  
   i. Research period  

4. Compare funded proposal themes with the SARE council themes.
Significance

The results of this study could yield benefits to the Southern United States by providing a greater understanding of the holistic nature of farming practices that promote sustainable agriculture. The subject of sustainability will be less ephemeral once sustainable agricultural production practices for the southern United States are identified. This knowledge would promote a higher understanding of sustainable systems and, therefore, motivate higher participation in sustainable agriculture research and education. This should culminate in selection and funding of deserving proposals.

The southern United States simulates most of the world's sub-tropical environment. Information on sustainable agriculture developed in this region is likely to be beneficial in other countries due to comparable agricultural enterprises such as cotton, sugar cane, rice, and corn. This applicability to tropical regions is important because many developing nations in these regions are seeking models to use for sound sustainable agricultural practices.

Collaborative research among researchers and farmers will promote faster adoption of sustainable agriculture production practices because the farmers will be stakeholders of the technology they develop. This approach will
enhance production of more acceptable goods and services in an environment that adheres to the basic tenets of sustainable agriculture, thus making U.S. goods more competitive in the global market.

Operational Definitions

The following operational definitions were used in this study:

Agronomy: Defined as plant breeding, soil science, plant physiology, and biological and agriculture engineering.

Animal science: Includes dairy science, animal nutrition, animal entomology and pathology, ranch, and other branches of veterinary science.

Biological utilization: Use of predators, parasites, breeding, and natural chemicals (allelopathy) in production operations.

Crop protection: Includes entomology, nematology, pathology, and weed science.

Cultural practice: A farming operation that producers employ to promote sustainability such as minimum tillage, intercropping, relay planting, strip planting, controlled grazing, and forest management.

Economic consideration: Defined as marketing, market survey, and management of resources.
Farming practice: Defined as any farm operation such as ranching, dairying, cropping, poultry, fish/wildlife management, and agroforestry.

Integrated livestock/cropping systems: Production systems that combine animal and cropping systems in production. This also includes multiple cropping where grasses and legumes together are included in farming operations.

Sustainable agriculture education: Refers to both formal and nonformal forms of technological transfer that support sustainability. Educational dissemination methods include: workshops, field days, meetings and networking (personal contact). Other methods include publishing in journals, papers, and books (publications), and radio, television, and newspaper (mass media).

Sustainable agriculture practice: Refers to any technology employed in crop and animal systems operation that promotes conservation of resources and prevents environmental degradation.

Southern region: Includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, and the Virgin Islands.

Pollution control: Includes erosion control, preservation of water quality, promotes safe disposal of plant and animal remains, and healthy sludge management.
Practitioner: Exclusively refers to farmers, research scientists from centers and institutions, and extension specialists.

Waste utilization: Refers to the utilization of plant, animal, and sludge for agricultural production.
CHAPTER II
LITERATURE REVIEW

The public is growing more and more concerned about the impact of agriculture on the environment. For example, studies by Hess (National Research Council, 1991, p. 18) show that in ten Midwest states, nine of ten indigenous water supplies analyzed by the U.S. Geological Survey contained varying amounts of agricultural chemicals. For this reason, the USDA has instituted a national program on SARE to develop and disseminate practical and reliable information on sustainable agriculture to farmers.

Sustainable Development

Environmental protection is a means of protecting human development and the long-term viability of the world’s natural resource systems, including biodiversity. Uncertain climatic conditions and fluctuation of the external economic environment conspire time and again to disrupt sustainability.

According to the United Nation’s African Confidential: African Recovery, Report No. 5 (1992), there are three principal factors conditioning a new sustainable approach to development and natural resource management: (a) the level and interplay of natural and human resources; (b)
national policies and institutions; and (c) external constraints related to debt, trade, aid, and technological choices. Sustainable development is gaining greater acceptance as compared to the historical development models which have tended to focus narrowly on economic growth. However, there is a need for education about sustainable development, in which sustainable agriculture plays a primary role.

The recent United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro, Brazil, culminated with "Agenda 21," an ambitious blueprint for sustainable development into the 21st century (Moughan, 1992). During this conference, sustainability remained a novel concept, as was evidenced by the journalists' constant consultation for interpretation of arcane environmental concepts, and the "Earth Summit's" modest framework for future commitment and progress in matters concerning sustainable development. This emphasizes the need for more education on sustainable development for policy makers and the consumers of information on sustainable development, such as sustainable agriculture, which is the hallmark for economic development in many developing countries.
Economic Environment

Benbrook (National Research Council, 1991) asserts that falling output prices often have made farming operations financially unstable by pushing farmers to bankruptcy. Other factors to consider include influences of diseases and pests, pressure on production, and/or inappropriate soil nutrients. Farms become financially unsustainable due to poor biological management that results in the poor performance of farming systems, and some of these economic forces are beyond the capabilities of the farmer to control. These are important forces that discourage sustainable agriculture production practices.

According to Crosson (1983), agricultural production systems consist of resources, technology, and the environment (RTE). These interrelated factors help to meet the demand for food and fiber. The process of production of food and fiber frequently yields various effluents such as eroded soils, fertilizers, excess of naturally occurring soil nutrients, pests, and salts. These effluents contribute to agricultural non-point source pollution, an aspect that needs to be controlled to safeguard the environment.

Crosson (1983) argued that in 1970 there was a rise in real cost of energy and fertilizers and increased evidence of scarcity of water for irrigation. This situation had
profound long-term impact on global RTE. The prospect that real energy prices and the price of energy-intensive inputs, such as fertilizers and pesticides, will rise poses a threat to the future performance of RTE agricultural systems. Selection of appropriate production technologies with respect to resource productivity is the hallmark of sustainable agriculture. This situation emphasizes the need for re-examining the conventional farming systems with a hope of promoting those practices that are more sustainable.

Conventional Farming Systems

Agriculture is recognized as one of the world’s greatest non-point environmental polluters. Agricultural chemicals such as pesticides, fertilizers, sediment discharge, and by-products from agricultural industries are major pollutants.

Hodges and Scofield (1983) argue that many of the agricologenic plant diseases arise from conventional husbandry. They, too, assert that conventional agriculture does have a much greater impact upon plant and animal health than do the alternative systems, due to simplification of the ecosystem unnecessarily and introduction of factors that are foreign to the system. The resurgence of pests after improper use of insecticides
and eutrophication of rivers and lakes is a good example. A much smaller incidence of agricologenic pathogenicity is likely to be experienced in a system of well-balanced biological agriculture. Therefore, there is a need to integrate indigenous knowledge systems with existing knowledge to build a complete package of information about sustainable agriculture. Kupchella and Hyland (1986) found that improper cultural practices, coupled with indiscriminate consumption of fossil fuels, continue to cause imbalances in the ecosystem.

Studies by Van Breemen and Feijtel (1990) show that green house gases, such as carbon dioxide, carbon monoxide, methane, and nitrous oxide, affect climate by influencing rise in temperatures and the sea level. These factors may be a threat to the whole world, and nations like America, endowed with favorable climate and good soils, have to take the lead in environmental protection to protect and sustain natural resources. In developing countries, it is not the quality of life that is at risk, but life itself.

Failure of cooperation among nations is yet another big threat to sustainability of agricultural farming systems. Deforestation in one country can lead to flooding in another, wind borne noxious gases and polluted seas and rivers do not stop at frontiers, and refugees fleeing from environmental catastrophes pose even a bigger challenge (Rhamadhar, 1992). The lessons from the current
conventional farming system have stimulated the concerns of many institutions, especially the international centers, to develop more sustainable and environmentally sound technologies.

International Research Concerns

The Washington-based Consultative Group on International Agricultural Research (CGIAR) has programs to sustain wheat and rice yields through breeding improvements for resistance to pests and diseases. CGIAR also has programs to develop crops and technologies for marginal and disadvantaged farmers (Ruttan, 1988). This is an important step toward sustainability in agricultural production systems.

Studies by Van Breeman and Feijtel (1990) show that scientists at the International Rice Research Institute (IRRI) are using farm grown nutrients, such as nitrogen fixing blue green algae, that thrive under flooded rice paddies. They also are screening strains of bacteria capable of enhancing soil fertility. In Nigeria, a leguminous African shrub called Sesbania has been identified as a nitrogen source for rice farmers. Research in Colombia has shown that good management of a soil-borne mychorrhiza (fungus) enhances plant root efficiency in the absorption of phosphorus from the soil. In 1986, the
Rockefeller Foundation embarked on improvement in biotechnology research programs on crops, such as sorghum and millet, which were overlooked by the private sector (Van Breeman and Feijtel, 1990). Wolf and Edward (1986) showed that the emphasis was to encompass soil conservation, water management, and environmentally sound technologies to help farmers reduce their reliance on purchased chemicals and fertilizers, in addition to developing new technologies that could restore degraded crop lands.

This new knowledge places a high premium on the need for a decentralized research effort. The scheme builds on the farmer-scientist collaboration and encourages farmers to be innovative. For sustainable agriculture to have the desired impact, innovations, and insights that help raise sustainable agricultural productivity will have to flow in all directions—among researchers and farmers, and between developing and industrial countries (Wolf and Edward, 1986). Due to limited research capabilities, especially in the developing world, the international research centers will be the sources of new knowledge on sustainable agriculture. The impact of this knowledge source will be felt more if there is constant consultation among researchers working in the national research centers and those at the international level.
Research Institutions

The National Research Council (1991) has recommended that universities, especially Land Grant systems, play a vital role in the future development of sustainable agriculture technologies. These institutions will have to create internal mechanisms to facilitate a multi-disciplinary approach to research. This will take cooperative interactions among members of different disciplines to develop sustainable agricultural systems.

To be more competitive in the global market, there is need for efficient technology that is environmentally sensitive. Coupled with this new knowledge, ways of sharing this information must be researched. There is also a need to re-examine indigenous production practices, particularly those dealing with ecological balance, because these systems have been known to develop and maintain sustainable agriculture practices. Once this information is established, it will be the duty of research and extension to present the information to the users in a simplified manner.

Agricultural Research and Extension

In agriculture, extension education is a communication link between researchers and farmers. According to the
World Bank (1990), "agricultural extension is a complex process that involves changing human behaviors through communication." This implies that extension is essential if farmers are to change from conventional farming systems to sustainable agricultural systems. It is known that researchers, commercial representatives, and extension agents bring new crop varieties and production techniques which are acceptable by farm families. The generation of sustainable agricultural technologies might not require an overhaul of the existing organizations and facilities, but perhaps a minor adjustment to accommodate sustainable agricultural practices within the conventional farming practices. In the United States, extension agents synthesize research-based information so that farmers are able to understand and adopt agricultural practices that are socially acceptable, environmentally sound, and economically feasible (National SARE Program, 1991).

Farming System Research and Education (FSR/E) is an extension education approach that places emphasis on more coherent research and extension links. This education system is in harmony with the views shared by the proponents of an interdisciplinary approach in the development of technologies for sustainable agriculture. According to Gips (1990), FSR/E has more integrated, practical, and sustainable agricultural practices than the conventional farming systems. Gips asserted that the FSR/E
approach and general education have played a crucial role in breaking down the barriers among critical disciplines such as agronomy, entomology, soil science, and pathology.

Interdependency among researchers, extension agents, and farmers is essential. Sustainability will be feasible if the human capabilities within the three sectors operate interdependently. The environment within which they operate has to be conducive to promote healthy interactions and integration of ideas among all the parties. The major component of this environment is the "political will" which influences policies and decisions made at local, regional, national, or even global levels.

In order to effectively create and instill appropriate sustainable agricultural production skills, system-based applied research, on-farm experimentation with farmers as research collaborators, and the use of novel extension education strategies must be expanded (Gips, 1990). Ideally, research efforts should place a premium on the application of ecological principles in the multidisciplinary study of farming systems' performance (National Research Council, 1991).

Eicher (1988) argues that sustainability in agricultural farming systems will require the development of high level technical research capacity that pursues strategies for the development of, or the "intelligent borrowing" of, technology from the rest of the world. An
example given was the development of hybrid corn in Zimbabwe and Kenya, with imported germplasms from Ecuador. Intelligent and systematic borrowing of technology is the hallmark of the dynamic economic growth of Japan, Singapore, South Korea, and many other countries. Therefore, intelligent borrowing or exchange of sustainable agriculture technologies and practices in those regions with similar environmental condition could pay dividends in the promotion of sustainable agriculture.

These technologies should be sustainably germane to receive wide acceptability by farmers and policy makers. This situation emphasizes an awakening need for farmers to be more proactive rather than defensive. This approach could help curb any public regulatory measures capable of depriving farmers of the rights to make decisions and the flexibility required for promoting sustainable agriculture. This view was expressively asserted in the contents of the 1990 U.S. Farm Bill (USDA, 1991). This Farm Bill gave farmers greater flexibility in their planting, crop use, crop rotation, and marketing options. Hence, it was a good opportunity for farmers to apply their knowledge and skills about sustainable agricultural production practices.

The Farm Bill also gave farmers incentives to change practices in environmentally sensitive areas, and provided greater research and technical assistance to operate in a sound environment. This example from the United States
illustrates a conducive national policy moving toward sustainable agriculture. The involvement of the farmers in planning and execution of research aids the farmers to have a stake in the technology developed and encourages them to adopt easily. For example, the SARE councils provide funding for research to farmers or anyone submitting an outstanding research proposal on sustainable agriculture.

SARE Programs

The SARE program has encouraged research on sustainable agriculture in many universities and research organizations (National Research Council, 1991). Since the inception of the LISA program in 1988, many projects on sustainable agriculture have been completed and others either are being started or are on-going. Some examples of such projects are: composting of poultry litter for economics and market potential of a renewable resource, supported by the Winrock International Institute for Agricultural Development and the University of Arkansas Cooperative Extension; and low-input and organic pest management at the Universities of Georgia, Arkansas, Florida, Tennessee, Oklahoma, North Carolina, and Clemson and Auburn Universities. More projects are on intercropping at Mississippi State University, on reduced chemical inputs with the Noble Foundation, and implementing
a low-input sustainable forage production in the Oklahoma-
Arkansas Ozark highland region and similar land areas. 
There are also projects on total resource budgeting of 
LISA-related management strategies (Southern Region SARE 
Projects, 1993).

Other areas where great strides toward sustainable 
agriculture have been accomplished include innovative 
farmers of Iowa, called Practical Farmers of Iowa (PFI). 
They have started building a new body of knowledge on 
sustainable agriculture where their main focus is on 
sustainability of land, soil, people, community, and 

The search for sustainable agricultural practices and 
systems in the 21st century is global, and southern United 
States' researchers are involved in this search. Modern 
institutions, are developing farming systems and crop 
varieties that promote sustainable agriculture. For 
example, they are responsible for development of perennial 
cereals capable of protecting the prairie environment from 
erosion, and extensive use of fertilizers and pesticides 
The SARE Council emphasizes the need to include in the 
proposals those farming practices that promote sustainable 
agriculture and protect the environment. For the Council 
to fund deserving proposals, the need for an appropriate
content analysis methodology of the proposals cannot be overemphasized.

Content Analysis

Progress in the science and humanities, and indeed the growth of all knowledge, is facilitated by constructive criticism (Mohamed, 1983). Consequently, sustainable agriculture research stands to gain from periodic evaluation and updating of the existing research system and programs. This examination would enhance both the rigor and relevance of research efforts in sustainable agriculture.

Holsti (1968) defined content analysis as "any technique for making inferences by systematically and objectively identifying special characteristics of messages." It is a method of data collection and a method of data analysis. Content analysis is similar to structured observation that uses a category system where the researcher directly observes live interaction and records the behavior in terms of predetermined categories, or views a videotape of the interaction and codes responses after the fact (Touliatos and Compton, 1992). The content analyst applies his or her categories to information in existing documents such as books, poems, songs, newspaper, magazines, letters, diaries, paintings, and recordings of
radio and television programs. It is also used to analyze transcripts of unstructured interviews, protocols of responses to projective personality measures, and sound or videotape recordings of counselling sessions. Content analysis can be either quantitative or qualitative in nature (Touliatos and Compton, 1992).

Content analysis is a method of studying and analyzing communications in a systematic, objective, and quantitative manner to measure variables. It could be considered as a method of observation and measurement (Kerlinger, 1973). Kerlinger states that in content analysis, the investigator makes questions of communication that people have made instead of observing their behavior directly, or asking them to respond to scales, or interviewing them. There is logic and economy in content analysis. Content analysis has general applicability. It can be used with the production of projective methods, with materials deliberately produced for research purposes, and with all kinds of verbal materials (Kerlinger, 1973).

Runkel and McGrath (1972) describe content analysis as a method applied to the task of extracting data from natural language, obtained either in written or oral form. This kind of task often arises when dealing with documents containing discursive prose that does not contain direct answers to questions that a researcher might have wanted to put to the subjects. Sometimes, the researcher deals with
newspaper, committee minutes, or other past records and must extract what evidences he or she can of the occurrence of the phenomenon sought. Basically, the task of content analysis consists of finding "units or mention to account for variables" (Runkel and McGrath, 1972). The main issue is to devise means of recording facts that are relevant to research, selected from the natural unlabeled universe.

Krippendorff (1990) identified four features of content analysis that make it a useful research tool: (a) it is an unobtrusive technique, (b) it accepts unstructured material, (c) it is context sensitive and therefore can process symbolic forms, and (d) it can cope with large volumes of data.

Another proponent of content analysis as a research methodology was Holsti (1968), who described four major systems of enumeration that are commonly used in content analysis: (a) appearance or nonappearance of an attribute within sentences, paragraph or whole units, depending on the recording unit adopted; (b) examination of the time or space devoted to a topic, as reflected in the amount of time or coverage allotted in a news broadcast or the headline size; (c) measurement of the characteristics of content by noting the frequency of occurrence of certain key words or ideas in letters, speeches, folktales, books, etc.; and (d) the intensity of expression to draw
inferences about attitudes and values (Touliatos and Compton, 1992).

Extensive review and critique of research articles has been carried out in vocational education on various topics, such as (a) background and summary of former critique, (b) internal validity problems, (c) external validity assessment, (d) analysis and reporting techniques, (e) significance of problems and issues addressed, and (f) scope of objectives and strategies studied (Schwandt, 1983). A classic example of article content analysis was provided by Schwandt (1983) using an adaptation of Steiner’s (1978) methodology. Schwandt reviewed 82 articles and classified them logically by quantitative educational research objectives and the inquiry strategies with which the empirical research was undertaken (Schwandt, 1983). Content analysis, therefore, is a useful tool in analyzing communication messages, and for the Southern Region SARE Council to promote good research, content analysis is an indispensable tool.

There are different methodologies employed in extraction of information from written documents and media presentations. One of those used most often is content analysis aided by various computer programs. Computers can be used to easily manipulate the text, displaying it in various ways that often reveal aspects of symbol usage not otherwise apparent (Weber, 1990, p. 13). Weber continues
to assert that many of these simple techniques produce highly reliable and valid indicators of symbolic content. For example, one can display all sentences or other units of text containing a particular word phrase. Another use of the computer is to count symbols, such as all occurrences of the phrase "United States," in a text. Weber continued to say that there is no simple right way to do content analysis, and content classification and interpretation by computer leads to perfect coder reliability (Weber, 1990, p. 15).

One of the most important advantages of computer-aided content analysis over hand-coded or interpretive content analysis is that the rules for coding text are made explicit, and once formalized in terms of computer programs and/or content coding schemes, the computer provides perfect coder reliability in the application of coding rule to text (Weber, 1990 p. 41). The key to content analysis, and indeed to all modes of inquiry, is choosing a strategy for information loss that yields substantively interesting and theoretically useful generalizations, while reducing the amount of information addressed by the analysis (Weber, 1990, p. 41). Weber continues to say that some advanced research designs use exploratory and confirmatory factor analysis to identify themes in the text. Analysis of variance and structural equation models often are used to relate these themes to other variables.
Another advantage of using computer-aided content analysis is that the same text can be analyzed easily using more than one category scheme. One set of text can easily be classified by more than one dictionary (Weber, 1990, p. 37). The text can be reclassified after making modification to an existing dictionary because of errors, or if changes seem justified in light of the particular text being analyzed. However, in qualitative data, the significant patterns are not principally encoded in any form that the computer can detect in instances (or absences) of lexical items (Pfaffengerger, 1988, p. 41). Pfaffengerger continues to contend that it is a basic canon of qualitative data analysis that the meaningful patterns in the data emerge only after a deliberate human confrontation with the data, in which the data is read and reread and, most important of all, rewritten (Pfaffengerger, 1988).

Steiner's (1978) methodology of analysis of educational research provides a framework for conceptualizing the domain of vocational education research. She maintained that the knowledge that would result from educational research when it was well done and when taken to solve problems consisted of characterization of the general properties of teacher, student, curriculum, setting, and interrelations of these properties (Schwandt,
1983). She further argued that these general properties could be classified into:

1. Scientific knowledge: i.e., generalizations and observations about the empirical world;

2. Praxeological knowledge: i.e., generalizations and observations of practices, that which is effective or good for something else (i.e., will a means be effective to a given end?); and

3. Philosophical knowledge: i.e., generalizations and observations of the ideal, that which is worthwhile or good in itself.

Cross-referencing the components of the teaching-learning process (teachers, students, curriculum, and setting) with the types of knowledge about these components (scientific, praxeological, philosophical) provided a logically adequate classification of the domain of vocational educational research objectives (Schwandt, 1983). Schwandt quotes Steiner (1978) to show that dependent variable(s) in each study determined the choice of component(s) and, once the studies were classified by components, they could be sorted into the type of knowledge produced: i.e., scientific, praxeological, philosophical, and setting (Table 1).

This example showed that 38.6% of the studies classified by Steiner were concerned with the teacher
component. Those concerned with students constituted only 13.7% (Schwandt, 1983).

Steiner's methodological research procedures could be employed by sustainable agriculture researchers in the characterization of atypical and typical general properties of certain sustainable agricultural practices. These sustainable agricultural practices vary widely and are regional specific.

Table 1

Classification of Journal of Industrial Teacher Education Studies by Class of Quantitative Research Objectives

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>n</th>
<th>Teacher</th>
<th>Student</th>
<th>Curriculum</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific</td>
<td>22</td>
<td>25.0</td>
<td>9.1</td>
<td>9.1</td>
<td>6.8</td>
</tr>
<tr>
<td>Praxeological</td>
<td>17</td>
<td>13.6</td>
<td>2.3</td>
<td>9.1</td>
<td>13.6</td>
</tr>
<tr>
<td>Philosophical</td>
<td>5</td>
<td>0</td>
<td>2.3</td>
<td>9.1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>38.6</td>
<td>13.7</td>
<td>27.3</td>
<td>20.4</td>
</tr>
</tbody>
</table>


Krippendorff (1990, p. 121) contended that in content analysis it is more usual to apply statistical tests after inferences have been obtained; for example, to summarize
classes of symbols or references made in a text, to test the statistical independence among attributes, or relate content analysis findings to results obtained by other research methods.

Krippendorff asserts that in content analysis, the researcher starts with a research problem and decides on the document to be studied after which relevant sources are identified. After the sources are identified, the next step involves the construction of descriptive categories directly related to the research problem, and development of precise operational definitions for each category (Krippendorff, 1990).

Whiteworth (1993) carried out content analysis of network evening news, television news magazines, and tabloid television news. He found that the tabloid news programs were exciting, attractive, and dramatic. The tabloid news used a greater variety of technical elements in their stories, and they focused on a limited number of topics. The network newscast showed an increased number of private individual bites which could be interpreted as trends toward more exciting stories. The study further indicated that television magazines hover between straight news and tabloid news (Whiteworth, 1993).

In 1982, Lee carried out content analysis of 25 industrial arts textbooks to determine readability level, grade reading level, concept loading, and vocabulary. The
grade reading levels ranged from grades 9.3 to 13.3, while many concepts and procedures were presented in a complex manner. He also found that many students had to learn both technical and sub-technical vocabulary (Lee, 1982). Asche (1983) evaluated 54 published research articles for internal validity and found that there was very little experimental research reported in the *Journal of Vocational Educational Research* and *Journal of Industrial Teacher Education* (Asche, 1983).

O'Reilly (1983) carried out content analysis to study external validity of published vocational educational research articles. He concluded that external validity was judged to be inadequate to warrant the generalization of 23 of the 54 manuscripts used in this study (O'Reilly, 1983). These analysis show that useful information can be gathered through content analysis.

**Synopsis**

In the 1960s and 1970s, environmentalists concentrated their efforts primarily on problems caused by urbanization and industrialization. By the mid-1980s, more attention had been turned to agriculture, and today the public has special interest in environmentally safe agriculture. The SARE program in the Southern Region is charged with the
responsibility to educate and motivate generations of appropriate sustainable agriculture technologies.

Misapplication of pesticides and fertilizers do contribute substantially to environmental pollution. Soil erosion, desertification, salinization, and air, soil, and water pollution by agricultural chemicals are primary environmental problems. Sustainable agriculture as an explicitly formulated concept is young in the Southern Region of the United States and it requires greater intellectual rigor because fundamental principles still need to be developed and refined.

There is tremendous potential for developing sustainable agricultural technologies in the Southern Region of the United States. Studies about sustainable agriculture could generate new solutions to specific problems now affecting agriculture and set new and better ways of thinking about agriculture in future.

The demand for environmentally sound technologies which are economically viable and socially acceptable are in harmony with increased global market competition for quality goods and services. This paradigm emphasizes that sustainable agricultural practices and related institutions have to be reviewed constantly. It is therefore reasonable to anticipate that in the 21st century, sustainable agricultural practices will dominate most aspects of
farming operations in the Southern Region of the United States.

Identification of researcher, proposed pertinent sustainable agricultural production practices was the main concern of this study. The Southern Region of the SARE program was the focus of this study, and a combination of literature review and previous research provided the information that helped to accomplish the objectives of this study.
CHAPTER III
RESEARCH METHODOLOGY

The purpose of this study was to compare the contents of funded and unfunded Southern Region SARE program proposals submitted in 1992, 1993 and 1994. The study, through content analysis, identified many variables that support sustainable agriculture in the Southern Region of the United States. The proposal contents were evaluated on the basis of variable frequencies emanating from proposal texts. A framework simulating Steiner’s procedure for content analysis of educational research was developed to evaluate the contents of proposals.

Modern computers can aid in processing large amounts of data, and the researcher used QUALPRO software to generate the frequencies of the variables to be analyzed.

To characterize sustainable agricultural production practices in the Southern Region, the QUALPRO Text Database Manager was employed in the processing of the frequencies and cross tabulations of the coded themes and practices. QUALPRO software enabled the researcher to reorganize, encode, and amplify the material from memory, which is regarded very crucial to the quality of the analysis (Pfaffenberger, 1988, p. 41). Hence, the researcher found QUALPRO software appropriate in the content analysis of the proposals in this study.
Population

The target population of this study was the sustainable agriculture proposals submitted to the Southern Region SARE Council for funding in three years from 1992 to 1994. Permission to use the SARE proposals was granted by USDA through the courtesy of Dr. William H. Brown, of Louisiana State University Agricultural Center, after a formal request by the researcher through his advisor, Dr. Barbara A. Holt (Appendix E).

A total of 567 proposals were submitted to the Southern Region SARE Council for funding consideration in 1992, 1993, and 1994. These proposals included 226 proposals from 1992, 210 proposals from 1993, and 131 proposals from 1994. For these 3 years, 32 of these proposals were funded.

It was decided that the 535 unfunded proposals submitted over the period of three years would be stratified by years, and a 10% simple random sample was drawn from each stratum. This gave a composite sample of $22 + 20 + 12 = 54$ proposals, which was compared with the census of 32 proposals funded over the three years.

The decision to stratify proposals by the three years was based on the consideration that the number of proposals submitted each year was different, and again, evaluation of proposals was not carried out by the same evaluators in the
three years. This stratification was based on Kerlinger's (1973) max-min-con principle where considerations were given to "maximize systematic variance" on the practice variable, because one purpose of this study was to determine the differences among the agricultural production practices most emphasized among funded and unfunded proposals.

Instrumentation

Coding Reliability

An important characteristic of qualitative analysis is reliability or consistency of the raters or coders. To assure coder reliability in this study, a pilot multicoder system was employed using expert coders. A stratified subsample of eight proposals from 1992 to 1994 was randomly selected. Three proposals were selected each from 1992 and 1993, and the remaining two proposals were from 1994. These eight proposals were from the unfunded proposals that remained after the experimental random sample was drawn. Expert coders were employed to manually code this subsample on the basis of the variables to be studied as indicated in objectives one through three. Two experts with Ph.D.'s in Vocational Education and in Extension Education (Appendix A) helped in pilot coding. The researcher and the experts
separately coded the eight proposals in the subsample. The researcher's coding agreed with 86.5% and 77.2% of the experts' coding. This level was above 2/3 (66.6%), the minimum required achievement by the researcher before the actual coding, as was set at the beginning of the study.

Each disagreement and/or omission between individual experts and the researcher was, however, discussed and agreed upon before the researcher did the actual coding in this study. This form of triangulation analysis, or use of several coders, helped to reduce the potential bias that would emanate from the researcher. This procedure provided a means of more directly assessing the reliability and validity of the data obtained as explained by Patton (1990).

Data Collection

Data were collected from the proposals submitted to Southern Region SARE in concert with the EPA from 1992 to 1994. These proposals included a census of 32 funded proposals and 54 randomly selected unfunded proposals. The researcher used QUALPRO Text Database Manager to generate frequencies and cross tabulations from the codes. QUALPRO is a computer-based qualitative data analysis tool. It arranges or rearranges data so that it is easy to analyze, easy to output and report. QUALPRO is particularly good in
open-ended survey responses and data from QUALPRO can be sorted endlessly by subject matter, coding scheme, data source and data/place of observation. QUALPRO output are in the form of frequencies and/or cross tabulations (Blackman, 1993).

Each proposal was read entirely and the funded and unfunded proposals were scanned using an optical scanner "K 6200 Document Input System" (1991) that read and then transferred the text to a disk (electronic storage medium). The scanned text was saved in ASCII and cross referenced with the original text. These saved data were retrieved and processed using the QUALPRO Text Database Manager software. The standard heading formats for QUALPRO were used to establish the headings for each text file.

To compare funded and unfunded proposals, special attention was placed on those coded agricultural production practices that researchers included in the proposals that would support sustainable agriculture in the Southern Region of the United States. The coded variables with the highest frequencies were assumed to reflect the variables of greatest concern as proposed by researchers.

Data Analysis

The analysis of funded and unfunded proposals was based on the following variables considered in this study:
Objective 1. Frequencies were used to describe funded proposals on the following characteristics:

- a. Research content themes
- b. Sustainable agricultural practices
- c. Emphasized research categories
- d. Amount of funds
- e. Research location
- f. Length of research periods
- g. Number of cooperators
- h. Occupation of principal investigators

Objective 2. Frequencies were used to describe unfunded proposals on the following characteristics:

- a. Research content themes
- b. Sustainable agricultural practices
- c. Emphasized research categories
- d. Amount of funds
- e. Research location
- f. Length of research periods
- g. Number of cooperators
- h. Occupation of principal investigators

Objective 3. Cross tabulations were used to compare funded and unfunded proposals on the following characteristics:

- a. Research content themes
b. Sustainable agricultural practices
c. Emphasized research categories
d. Amount of funds
e. Research location
f. Length of research periods
g. Number of cooperators
h. Occupation of principal investigators

Objective 4. Descriptive statistics (frequencies) were used to describe the themes of each funded proposal. The funded proposal coded themes were compared with the ten themes prescribed by the Southern Region SARE Council:

1. Fish/Wildlife
2. Pollution prevention
3. Biological implications
4. Conservation/Tillage
5. Multiple use of forage
6. Animal systems
7. Agroforestry systems
8. Educational-conferences
9. Impact assessment, and
10. Multiple land use
CHAPTER IV
RESULTS AND DISCUSSIONS

The purpose of this exploratory descriptive study was to describe and compare funded and unfunded research proposals on themes, sustainable agriculture practices, research categories, and the funds requested for research. The study also sought to describe and compare 32 funded and 54 unfunded research proposals on the following selected characteristics: research location (state), occupation of principal investigators, number of research cooperators, length of research period, and research budget. The information came from the 1992 to 1994 SARE program proposals submitted from the Southern Region of the United States.

The data for this study were collected from scanned text of proposals. QUALPRO Data Base Manager was used to generate frequencies and cross tabulations from the coded text.

There were four specific objectives of this study. The results are presented in the following sections based on the objectives of the study.
Objective 1

The first objective was to describe the funded proposals on the following characteristics: content themes, sustainable agriculture practices, research categories, research period, budget, location, cooperators, and the occupations of the principal investigators. Thirty-two funded proposals from 1992 to 1994 were used for this purpose.

Table 2 gives a summary of sustainable agriculture research themes as coded from the 32 funded proposals. About 31% of the proposals placed most emphasis on animal systems research. Animal systems research included projects related to dairying, ranching, poultry, and some aspects of wildlife. Cropping systems, where great importance was attached to practices on cover cropping, relay planting, and pest and disease management, represented about 22% of the proposals. Use of biological inputs, such as predation, parasitism, and use of superior plant types that are ecologically adjusted, represented about 13% of the 32 funded proposals. Animal systems represented the highest frequencies of the themes coded in the 1993 and 1994 funded proposals while five categories multiple land use, cultural practice, sustainable agricultural practices, marketing research, and
agroforestry together each represented the lowest frequencies of only 3.1% of the 32 funded proposals (Table 2).

Table 2

<table>
<thead>
<tr>
<th>Themes</th>
<th>1992 (N=10)</th>
<th>1993 (N=11)</th>
<th>1994 (N=11)</th>
<th>Total N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal systems</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td>10</td>
<td>31.3</td>
</tr>
<tr>
<td>Cropping systems</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>21.8</td>
</tr>
<tr>
<td>Biological input</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>12.5</td>
</tr>
<tr>
<td>Impact assessment</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>6.3</td>
</tr>
<tr>
<td>Pollution control</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>6.3</td>
</tr>
<tr>
<td>Integrated cropping systems</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>6.3</td>
</tr>
<tr>
<td>Agroforestry</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3.1</td>
</tr>
<tr>
<td>Marketing research</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3.1</td>
</tr>
<tr>
<td>Sustainable agriculture education</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3.1</td>
</tr>
<tr>
<td>Multiple land use</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3.1</td>
</tr>
<tr>
<td>Cultural practices</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>11</strong></td>
<td><strong>11</strong></td>
<td><strong>32</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Table 3 gives a summary of sustainable agricultural practices that were coded from the 32 funded proposals. The frequencies of the coded practices were processed using QUALPRO Data Base Manager. Cropping practices had the highest frequencies, about 25%. Utilization of organic matter as a source of animal and plant nutrients was meant to replace part or all synthetic inputs. This aspect of research was aimed at recycling both animal and plant remains to conserve and safely protect the environment from degradation. About 13% of the funded proposals generated information in this specialty (Table 3). Cover cropping, intercropping of grasses with legumes, and mulching were significant practices emphasized under organic matter utilization. Practices emphasizing economic consideration were the third most prevalent and represented 10.2% of the sustainable agricultural practices in the 32 funded proposals.

Table 4 summarizes the research categories as coded from the funded proposals. Research categories had been defined by the Southern SARE Council but the investigators were not restricted to these categories. Integrated and experimental research topics were most prevalent categories among the funded proposals. Each of these two categories accounted for about 44% of the projects over the three year period. This high percentage left fish/wildlife, exploratory, and sustainable agriculture education groups
Table 3

Sustainable Agriculture Practices Emphasized in SARE Funded Proposals, 1992 to 1994

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cropping practices</td>
<td>11</td>
<td>13</td>
<td>8</td>
<td>32</td>
<td>25.2</td>
</tr>
<tr>
<td>Organic matter input</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>16</td>
<td>12.7</td>
</tr>
<tr>
<td>Economic consideration</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>13</td>
<td>10.2</td>
</tr>
<tr>
<td>Sustainable agriculture education</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>12</td>
<td>9.5</td>
</tr>
<tr>
<td>Preservation of water quality</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>11</td>
<td>8.7</td>
</tr>
<tr>
<td>Waste utilization</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>4.7</td>
</tr>
<tr>
<td>Biological input</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>6</td>
<td>4.7</td>
</tr>
<tr>
<td>Reduced synthetic input</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>3.9</td>
</tr>
<tr>
<td>Rotation</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>3.1</td>
</tr>
<tr>
<td>Diversification</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>3.1</td>
</tr>
<tr>
<td>Marketing research</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>3.1</td>
</tr>
<tr>
<td>Conservation of resources</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>3.1</td>
</tr>
<tr>
<td>Grazing management</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2.4</td>
</tr>
<tr>
<td>Pollution control</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>2.4</td>
</tr>
<tr>
<td>Use of low cost input</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>2.4</td>
</tr>
<tr>
<td>Erosion control</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>48</strong></td>
<td><strong>37</strong></td>
<td><strong>42</strong></td>
<td><strong>127</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

*Note.* Some of the listed sustainable agriculture practices were coded more than once in each funded proposal (Appendix D-1).
Table 4

Funded Proposal Research Categories, 1992 to 1994

<table>
<thead>
<tr>
<th>Research categories</th>
<th>1992 (N=10)</th>
<th>1993 (N=11)</th>
<th>1994 (N=11)</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated research</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>14</td>
<td>43.8</td>
</tr>
<tr>
<td>Experimental research</td>
<td>3</td>
<td>8</td>
<td>3</td>
<td>14</td>
<td>43.8</td>
</tr>
<tr>
<td>Exploratory</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>6.2</td>
</tr>
<tr>
<td>Fish/Wildlife</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3.1</td>
</tr>
<tr>
<td>Sustainable agriculture education</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>11</strong></td>
<td><strong>11</strong></td>
<td><strong>32</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

together with only about 12% of the total research categories.

Integrated research topics emphasized the utilization of different technologies in the generation of sustainable agriculture information. These technologies focused on environmentally safe methods of disposing waste, while at the same time utilizing the same waste in raising pastures and other crops. On the other hand, experimental research focused on technologies that emphasized generating sustainable agriculture information by use of the
appropriate research designs, such as randomized block
designs (RBD), Latin square, and split plot designs.

Table 5 gives the frequencies of the research budget
for 10 of the 11 funded proposals in 1994. There was no
budget information for one proposal in 1994 and for none of
the proposals submitted in 1992 and 1993. The information
available was not adequate for sound interpretation of the

Table 5
Funded Proposal Budgets, 1994

<table>
<thead>
<tr>
<th>Budget ($1,000)</th>
<th>1994 (N=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ 0 - 20</td>
<td>0</td>
</tr>
<tr>
<td>$ 41 - 60</td>
<td>1</td>
</tr>
<tr>
<td>$ 61 - 80</td>
<td>2</td>
</tr>
<tr>
<td>$ 81 - 100</td>
<td>0</td>
</tr>
<tr>
<td>$101 - 120</td>
<td>1</td>
</tr>
<tr>
<td>$121 - 140</td>
<td>0</td>
</tr>
<tr>
<td>$141 - 160</td>
<td>2</td>
</tr>
<tr>
<td>$161 - 180</td>
<td>0</td>
</tr>
<tr>
<td>$181 - 200</td>
<td>2</td>
</tr>
<tr>
<td>$201 - 220</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>

Mean = ($140.5), mean range = $141-160
32 funded proposals, and therefore, was not described (Table 5).

Table 6 shows the origin of funded research proposals

Table 6
Funded Proposal Origin, 1992 to 1994

<table>
<thead>
<tr>
<th>States</th>
<th>1992 (N=10)</th>
<th>1993 (N=11)</th>
<th>1994 (N=11)</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>18.7</td>
</tr>
<tr>
<td>North Carolina</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>15.6</td>
</tr>
<tr>
<td>Georgia</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>12.5</td>
</tr>
<tr>
<td>Florida</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>12.5</td>
</tr>
<tr>
<td>Texas</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>9.4</td>
</tr>
<tr>
<td>Tennessee</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>6.3</td>
</tr>
<tr>
<td>South Carolina</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>6.3</td>
</tr>
<tr>
<td>Virginia</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>6.3</td>
</tr>
<tr>
<td>Alabama</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>6.3</td>
</tr>
<tr>
<td>Kentucky</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3.1</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3.1</td>
</tr>
<tr>
<td>Mississippi</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Virgin Island</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>32</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Zero value indicates that there was no funded proposal in the respective year and state.
by states for the period covering 1992 to 1994. The state of Arkansas had the highest number of proposals funded over the three years. This represented about 19% of the funded proposals. North Carolina had the second highest number of funded proposals (15.6%). Georgia and Florida each received about 13% of the funded proposals during the study period. Of 11 states, five (Arkansas, North Carolina, Georgia, Florida, and Texas) together were the source of about 67% of all the funded proposals (Table 6).

Over 60% of the funded research proposals took three years (Table 7). The highest number of funded proposals took three years and majority were submitted in 1994. There was only one proposal from 1993 that included 3 years

Table 7
Funded Proposal Duration in Years, 1992 to 1994

<table>
<thead>
<tr>
<th>Duration of research project</th>
<th>1992 (N=10)</th>
<th>1993 (N=11)</th>
<th>1994 (N=11)</th>
<th>Total N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>2 years</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>16.7</td>
</tr>
<tr>
<td>3 years</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>11</td>
<td>61.1</td>
</tr>
<tr>
<td>4 years</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>1</td>
<td>10</td>
<td>18</td>
<td>100.0</td>
</tr>
</tbody>
</table>
in the research period (Table 7). Only eighteen of the thirty-two funded proposals showed the duration of research period.

Table 8 shows the number of people who cooperated in writing funded proposals. Four cooperators per research project was the highest frequency coded (25%). Three cooperators per project was the second highest frequency (17.9%). Most funded proposals had more than three cooperators (Table 8).

From the 32 funded proposals, three principal investigator occupations were identified (Table 9). The largest group was professors from universities who submitted 56.3% of the proposals. Another group of principal investigators was classified as researchers (37.5%). This group represented research centers and institutions conducting research on various aspects of sustainable agriculture. The remaining 6.2% was made up of farmers who had their research proposals funded in 1992 and 1993. No proposal was funded in 1994 for which a farmer was the principal investigator.

Summary of Objective 1

Results pertaining to Objective 1 show that animal systems research was the most emphasized theme among the 32 funded proposals, and cropping systems theme was the
Table 8
Funded Proposal Cooperators, 1992 to 1994

<table>
<thead>
<tr>
<th>Number of cooperators</th>
<th>1992 (N=10)</th>
<th>1993 (N=11)</th>
<th>1994 (N=11)</th>
<th>Total N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>14.3</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>5</td>
<td>17.9</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>25.0</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>10.7</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>7.1</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>7.1</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>10.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td>7</td>
<td>11</td>
<td>28</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean number of cooperators 4.5 per proposal

* There was no information given on the number of research cooperators on four proposals in 1993.

second. The variable, cropping system, was the most emphasized sustainable agriculture practice among the funded proposals.

Integrated and experimental research categories were equally emphasized research topics among the 32 funded
Table 9

Funded Proposal Principal Investigator Occupations, 1992 to 1994

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>18</td>
<td>56.3</td>
</tr>
<tr>
<td>Researcher</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>12</td>
<td>37.5</td>
</tr>
<tr>
<td>Farmer</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>6.2</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>32</td>
<td>100.0</td>
</tr>
</tbody>
</table>

proposals. The highest number of funded proposals were submitted from Arkansas, followed by North Carolina. The majority of these proposals were planned for a three year period and four research cooperators per project was the highest frequency coded. The highest percentage of the 32 funded proposals were written and submitted by professors as principal investigators.

Objective 2

The second objective of this study was to describe the following characteristics: content themes, sustainable agricultural practices, research categories, research
period, budget, location, and the occupations of principal investigators in unfunded proposals. These variables were gleaned from a sample of 54 unfunded proposals submitted to the SARE council from 1992 to 1994.

Of the 54 unfunded proposals in this study, 12 (22.2%) placed most emphasis on sustainable agricultural practices that involved cropping systems (Table 10). Cropping systems include such farming practices as intercropping, multiple cropping, relay planting, and crop rotations. Another 22.2% of the 54 unfunded proposals concentrated on animal systems research. This type of research includes, but is not limited to, grazing management practices such as proper stocking rates on ranches. The research also generated information on animal waste disposal in dairy, poultry, and pig industries. Ten of the 54 proposals placed emphasis on conservation tillage. Conservation tillage involves such practices as no-till, minimum tillage, strip-cropping, and cover cropping.

The educational component was emphasized in 11.1% of the unfunded proposals. Research programs suggested development of educational materials, such as economic, crop, and animal production computer software, and publication of journals. Other educational programs, such as field days, demonstrations, and video tape programs, also were emphasized in the unfunded proposals. Four main themes--cropping systems, animal systems, conservation
Table 10

Unfunded Proposal Themes, 1992 to 1994

<table>
<thead>
<tr>
<th>Research themes</th>
<th>1992 (n=20)</th>
<th>1993 (n=22)</th>
<th>1994 (n=12)</th>
<th>Total n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cropping system</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>12</td>
<td>22.2</td>
</tr>
<tr>
<td>Animal systems</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>12</td>
<td>22.2</td>
</tr>
<tr>
<td>Conservation tillage</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>10</td>
<td>18.5</td>
</tr>
<tr>
<td>Sustainable agriculture</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>11.1</td>
</tr>
<tr>
<td>education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollution control</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>7.4</td>
</tr>
<tr>
<td>Fish/Wildlife</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>7.4</td>
</tr>
<tr>
<td>Biological input</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3.7</td>
</tr>
<tr>
<td>Integrated cropping system</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Marketing research</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Breeding</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Agroforestry</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>22</td>
<td>12</td>
<td>54</td>
<td>100.0</td>
</tr>
</tbody>
</table>

tillage, and sustainable agriculture education-together represented 74% of the 54 unfunded proposals (Table 10).

Results in Table 11 show that the 54 unfunded proposals contained 224 mentions of sustainable agriculture
practices. Thirty-two mentions (14.3%) placed emphasis on cropping practices, 10.7% on organic matter utilization, and 10.3% on developing and transferring technologies in those practices that support sustainable agricultural education. An average of four sustainable agricultural practices was suggested in each of the 54 unfunded proposals.

Table 11 shows that 7 of the 17 practices accounted for 68.7% of the sustainable agriculture practices coded. The seven practices were: cropping practices, organic matter input, sustainable agricultural education, pollution control, economic consideration of sustainable agricultural production practices, waste utilization, and reduced use of synthetic inputs in agricultural production. Most of these practices were emphasized in the 1992 and 1993 research proposals (Table 11).

In Table 12, 34 (62.9%) of the unfunded proposals emphasized experimental research. In 1992, 19 (95%) of the 20 proposals were in the experimental research category. Integrated research, i.e., raising livestock and crops together, and multiple cropping of grasses and leguminous crop categories, were suggested in 20.4% of the 54 unfunded proposals. Over the 3-year period, demonstration, impact assessment, and sustainable agriculture education
Table 11

**Sustainable Agriculture Practices Emphasized in SARE Unfunded Proposals, 1992 to 1994**

<table>
<thead>
<tr>
<th>Practices</th>
<th>1992</th>
<th>1993</th>
<th>1994</th>
<th>Total n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cropping practices</td>
<td>16</td>
<td>13</td>
<td>3</td>
<td>32</td>
<td>14.3</td>
</tr>
<tr>
<td>Organic matter input</td>
<td>9</td>
<td>7</td>
<td>8</td>
<td>24</td>
<td>10.7</td>
</tr>
<tr>
<td>Sustainable agriculture education</td>
<td>7</td>
<td>10</td>
<td>6</td>
<td>23</td>
<td>10.3</td>
</tr>
<tr>
<td>Pollution control</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>22</td>
<td>9.8</td>
</tr>
<tr>
<td>Economic consideration</td>
<td>7</td>
<td>8</td>
<td>3</td>
<td>18</td>
<td>8.1</td>
</tr>
<tr>
<td>Waste utilization</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>18</td>
<td>8.1</td>
</tr>
<tr>
<td>Reduced synthetic input</td>
<td>8</td>
<td>9</td>
<td>0</td>
<td>17</td>
<td>7.6</td>
</tr>
<tr>
<td>Biological input</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>13</td>
<td>5.8</td>
</tr>
<tr>
<td>Resource management</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>13</td>
<td>5.8</td>
</tr>
<tr>
<td>Erosion control</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>10</td>
<td>4.4</td>
</tr>
<tr>
<td>Marketing research</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>9</td>
<td>4.0</td>
</tr>
<tr>
<td>Preservation of water quality</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>8</td>
<td>3.6</td>
</tr>
<tr>
<td>Integrated cropping /Animal system</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td>Energy conservation</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>Minimum tillage</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td>Inter-cropping system</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td>Rotation</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
</tbody>
</table>

**Total** | 88   | 95   | 41   | 224     | 100.0 |
categories represented only a combined 16.7% of the unfunded proposals (Table 12).

Table 12
Unfunded Proposal Categories, 1992 to 1994

<table>
<thead>
<tr>
<th>Category</th>
<th>1992</th>
<th>1993</th>
<th>1994</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental research</td>
<td>19</td>
<td>9</td>
<td>6</td>
<td>34</td>
<td>62.9</td>
</tr>
<tr>
<td>Integrated systems</td>
<td>1</td>
<td>10</td>
<td>0</td>
<td>11</td>
<td>20.4</td>
</tr>
<tr>
<td>Demonstration</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>9.3</td>
</tr>
<tr>
<td>Impact assessment</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>3.7</td>
</tr>
<tr>
<td>Sustainable agriculture education</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>3.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>22</strong></td>
<td><strong>12</strong></td>
<td><strong>54</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

There was no information about the proposed research budgets for 1993, but Table 13 shows data on the other two years in this study. There were three proposals in 1992 that included budgets of $41,000 to $80,000. Eleven (91.7%) of the unfunded proposals submitted in 1994 had shown their budget requirements (Table 13).

In 1992 and 1994, unfunded proposals had budgets in the range below $20,000 to above $260,000. About 29% of
Table 13

Unfunded Proposal Budgets, 1992 to 1994

<table>
<thead>
<tr>
<th>Budgets ($1,000)</th>
<th>1992 (n=20)</th>
<th>1994 (n=12)</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below $20</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>$ 21 - 40</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$ 41 - 60</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>28.6</td>
</tr>
<tr>
<td>$ 61 - 80</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>$ 81 - 100</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>14.4</td>
</tr>
<tr>
<td>$101 - 120</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>14.4</td>
</tr>
<tr>
<td>$121 - 140</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>$141 - 160</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>$161 - 180</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$181 - 200</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>Above $260</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>11</td>
<td>14</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Means = ($116.1), Mean range = $101-120

Note. Only three proposals showed budget information for 1992. In 1994 there was only one proposal that did not include a budget. No information on budgets was available for 1993.

the proposed budgets were in the range of $41,000 to $60,000.
There was wide variation in the proposal budgets submitted in the two years. The lowest budget was below $20,000, while the highest budget was above $260,000 (Table 13). The highest frequency of proposals submitted budgets in the range of $41,000 to $120,000. Eight unfunded proposals out of fourteen submitted their budgets in this range. However, the information in Table 13 was not considered sufficient to make sound conclusions.

From 1992 to 1994, unfunded proposals for SARE came from 12 of the 15 states in the Southern Region of the SARE program. Virginia, Costa Rica and Virgin Islands had no proposals included in the sample (Table 14). Florida represented the highest total frequency of unfunded proposals (16.3%), while Georgia had the second highest frequency of 14.3% proposals in 1993, followed by Texas and Tennessee each with 10.2 % of unfunded proposals.

Table 15 shows that over 56% of the proposals described projects that were proposed to take three years for completion. Twenty-five percent proposed a research period of two years, and the remaining had proposed one, four, or five years to finalize their research projects. Only 16 of the 54 unfunded proposals had shown the duration of their research period (Table 15).

In Table 16, the frequencies of the number of sustainable agriculture research cooperators from the 54
Table 14
Unfunded Proposal Origins, 1992 to 1994

<table>
<thead>
<tr>
<th>States</th>
<th>1992 (n=20)</th>
<th>1993 (n=22)</th>
<th>1994 (n=12)</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>8</td>
<td>16.3</td>
</tr>
<tr>
<td>Georgia</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>7</td>
<td>14.3</td>
</tr>
<tr>
<td>Texas</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>10.2</td>
</tr>
<tr>
<td>Tennessee</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>10.2</td>
</tr>
<tr>
<td>Mississippi</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>8.2</td>
</tr>
<tr>
<td>North Carolina</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>8.2</td>
</tr>
<tr>
<td>Kentucky</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>8.2</td>
</tr>
<tr>
<td>South Carolina</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>6.1</td>
</tr>
<tr>
<td>Arkansas</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>6.1</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>6.1</td>
</tr>
<tr>
<td>Louisiana</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>4.1</td>
</tr>
<tr>
<td>Alabama</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>Virgin Island</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td><strong>19</strong></td>
<td><strong>11</strong></td>
<td><strong>49</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

**Note.** Information was missing for one proposal in 1992, two in 1993, and one in 1994.
### Table 15

**Unfunded Proposal Duration in Years, 1992 to 1994**

<table>
<thead>
<tr>
<th>Duration of Research Project</th>
<th>1992 (n=20)</th>
<th>1993 (n=22)</th>
<th>1994 (n=12)</th>
<th>Total n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>6.3</td>
</tr>
<tr>
<td>2 years</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>25.0</td>
</tr>
<tr>
<td>3 years</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>9</td>
<td>56.3</td>
</tr>
<tr>
<td>4 years</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6.3</td>
</tr>
<tr>
<td>5 years</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>6.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
<td><strong>3</strong></td>
<td><strong>8</strong></td>
<td><strong>16</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Unfunded proposals are summarized. Of the 54 unfunded proposals, only 47 had indicated the number of research cooperators. Over the three years, 21.3% of the unfunded proposals would engage four research cooperators, and about 17% of the proposals planned to have two cooperators. Fewer than 10% had seven or more cooperators (Table 16).

Table 17 shows that professors from universities, researchers from research centers and institutes, farmers, and extension agents were the main occupations of the principal investigators documented in the contents of the 54 unfunded research proposals. Professors were
Table 16

Unfunded Proposal Cooperators, 1992 to 1994

<table>
<thead>
<tr>
<th>Number of Total cooperators</th>
<th>1992 (n=20)</th>
<th>1993 (n=22)</th>
<th>1994 (n=12)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>12.8</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>8</td>
<td>17.0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>14.9</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>10</td>
<td>21.3</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>10.7</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>14.9</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>10+</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>22</td>
<td>8</td>
<td>47</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean 3.9 cooperators per proposal

represented in 54.7% of all the proposals. The second highest occupation was that of researchers, who shared 30% of the unfunded proposals.

The remaining were the farmers and extension specialists who, together with others, submitted research proposals as principal investigators. Over the three
Table 17

Unfunded Proposal Principal Investigator Occupations, 1992 to 1994

<table>
<thead>
<tr>
<th>Occupations</th>
<th>1992 (n=20)</th>
<th>1993 (n=22)</th>
<th>1994 (n=12)</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>11</td>
<td>13</td>
<td>5</td>
<td>29</td>
<td>54.7</td>
</tr>
<tr>
<td>Researcher scientist</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>16</td>
<td>30.2</td>
</tr>
<tr>
<td>Farmer</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>5.7</td>
</tr>
<tr>
<td>Extensionist</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>9.4</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>22</td>
<td>11</td>
<td>53</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. There was no information on one of the proposals in 1994.

years, most proposals were from professors, followed by researchers (Table 17).

Summary of Objective 2

The results related to Objective 2 are summarized in Tables 10 through 17. Cropping and animal systems were the most emphasized themes among the 54 unfunded research proposals. Among the practices, cropping practices had the highest frequency, while experimental research was the most emphasized research category. The high number of unfunded
proposals submitted a budget in the range of $41,000 to $60,000, and the majority of the unfunded proposals were from Florida and Georgia. The majority of unfunded proposals were submitted with professors as the principal investigators.

**Objective 3**

The third objective of this study was to compare the contents of the funded and unfunded proposals from 1992 to 1994 on the following selected characteristics: research content themes, sustainable agriculture practices, emphasized research categories, amount of funds requested, research location, length of research period, number of research cooperators, and the occupations of the principal investigators. The comparison of the funded and unfunded proposals was based on coded variables from the 32 funded and 54 unfunded proposals.

Frequency tables and Cramer’s contingency coefficients (Cramer’s V) were calculated to guide in drawing the comparisons between funded and unfunded proposals. The practical interpretation of the Cramer’s contingency coefficients was based on the set of descriptors by Davis: 0.00 to 0.09 is interpreted as none or negligible correlation; 0.10 to 0.29, low correlation; 0.30 to 0.49
substantial correlation; 0.50 to 0.79, high correlation; and 0.80+, very high correlation.

Using text content frequencies analyzed through QUALPRO, it became clearly logical to regroup those variables of interest into broad compatible groups. The regrouping was necessary because some of the variables had very low frequencies to be validly analyzed statistically. Some of the variables had very low cases to logically be grouped in frequency tables (Appendix D). The groupings were based on the themes and the objectives of each proposal because each proposal originally presented one theme. The regrouping made it possible to describe variables common to both funded and unfunded proposals that were more easily compared.

Comparison between funded and unfunded proposals was based on these new groups (Tables 18 to 25). Variables from each year also were combined because the census of 32 funded proposals resulted in insufficient cases to be considered on a yearly basis. This alternative was feasible because the frequencies of various variables from QUALPRO indicated that there were many similarities among variables of interest coded during each of the three years considered in the study (Tables 2 through 17). It was, therefore, considered reasonable to do the comparison of variables among the funded and unfunded proposals from the combined results of 1992, 1993, and 1994.
There were four main themes that were identified after regrouping the themes in Objectives 1 and 2.

Combined themes:

1. Cropping systems
   - agroforestry
   - integrated cropping system
   - multiple land use
   - cultural practices
   - conservation tillage

2. Animal systems
   - fish and wildlife

3. Sustainable agriculture education
   - marketing research
   - pollution control
   - impact assessment

4. Biological input
   - breeding

Under Objective 3, a Chi-square test of independence was used to compare study variables in funded and unfunded proposals. The obtained Chi-square values for the eight variables in objective three were not significant. These results indicated that the eight variables considered under funded and unfunded proposals were not significantly different. However, observations were made on the eight variables due to the qualitative nature of the data.
Cropping systems contributed the highest theme frequencies among the combined funded and unfunded proposals. Of the four new themes, biological input had the lowest frequency among both the funded and unfunded proposals with about 38% share of funded and 41% of unfunded proposals (Table 18). Biological input had the lowest frequency among both the unfunded (7.4%) and funded (12.5%) proposals.

Table 18
Comparison of Funded and Unfunded Proposal Themes, 1992 to 1994

<table>
<thead>
<tr>
<th>Themes</th>
<th>Funded (N=32)</th>
<th>%</th>
<th>Unfunded (n=54)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cropping systems</td>
<td>12</td>
<td>37.5</td>
<td>22</td>
<td>40.8</td>
</tr>
<tr>
<td>Animal systems</td>
<td>10</td>
<td>31.2</td>
<td>16</td>
<td>29.6</td>
</tr>
<tr>
<td>Sustainable agriculture education</td>
<td>6</td>
<td>18.8</td>
<td>12</td>
<td>22.2</td>
</tr>
<tr>
<td>Biological input</td>
<td>4</td>
<td>12.5</td>
<td>4</td>
<td>7.4</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100.0</td>
<td>54</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Column percentage.

$X^2$ value = .746,  $P$ value = .862
Table 19 shows a summary of sustainable agricultural practices from the content analysis of the combined 32 funded and 54 unfunded proposals. Table 19 is a summary of values in Appendix D. The groupings were based on the meanings derived from the proposal themes and objectives.

Table 19

**Comparison of Funded and Unfunded Proposals by Sustainable Agriculture Practices, 1992 to 1994**

<table>
<thead>
<tr>
<th>Practices</th>
<th>Funded (N=32)</th>
<th>%</th>
<th>Unfunded (n=54)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming Practices</td>
<td>21</td>
<td>65.6</td>
<td>31</td>
<td>57.4</td>
</tr>
<tr>
<td>Sustainable agricultural education</td>
<td>8</td>
<td>25.0</td>
<td>11</td>
<td>20.4</td>
</tr>
<tr>
<td>Waste utilization</td>
<td>3</td>
<td>9.4</td>
<td>12</td>
<td>22.2</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100.0</td>
<td>54</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Column percentage.

X² value = 2.320, P value = .313

When the primary variable was sustainable agriculture practices, over 65% of the funded proposals and 57.4% of unfunded proposals placed emphasis on farming practices.
Of funded proposals, 25% emphasized sustainable agricultural education but only but only 20.4% of the unfunded proposals did so. Waste proposal utilization was more prevalent among unfunded (22.2%) than funded (9.4%) proposals.

Table 20 shows the summarized research categories for sustainable agriculture from the 32 funded and 54 unfunded research proposals. Forty-seven of the research proposals

Table 20

Comparison of Funded and Unfunded Proposals by Categories, 1992 to 1994

<table>
<thead>
<tr>
<th>Categories</th>
<th>Funded (N=32)</th>
<th>Unfunded (n=54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated research</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>46.8</td>
<td>22.2</td>
</tr>
<tr>
<td>Experimental research</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>43.8</td>
<td>61.1</td>
</tr>
<tr>
<td>Sustainable agriculture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>education</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>9.4</td>
<td>16.7</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Column percentage.

X² value = 5.763, P value = .056
fell under the category of experimental research. About 44% of the funded proposals were under this category while 61.1% of the unfunded proposals were in experimental research category. However, Table 20 shows that the highest percentage (46.8%) of the funded proposals were those submitted under the integrated research system. Table 20 emphasizes that funded proposals were almost split between the two types of research proposals, while unfunded were heavy on experimental. Neither group placed much emphasis on education. This last aspect can be attributed to the fact that research in developing technologies on sustainable agriculture is on going and whatever information is available is new.

Table 21 shows a summary comparison of research budgets for both funded and unfunded proposals submitted in 1994. Budget information in the proposals of 1992 and 1993 was not available and the remaining information was not adequate to draw any sound conclusion.

Florida submitted the highest number of proposals over the three year period under study (Table 22). The highest number of funded proposals, however, came from Arkansas, with 25% of all the funded proposals and North Carolina (20.8%). The highest number of unfunded proposals came from Florida (25%), Georgia (21.9%) (Table 22).
Table 21

Comparison of Funded and Unfunded Proposal Budgets, 1994

<table>
<thead>
<tr>
<th>Budget ($1,000)</th>
<th>Funded (N=11)</th>
<th>Unfunded (n=12)</th>
<th>Total n</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ 1 - 100</td>
<td>3 30%</td>
<td>5 45.5%</td>
<td>8 38.1%</td>
</tr>
<tr>
<td>$101 - 200</td>
<td>5 50%</td>
<td>5 45.5%</td>
<td>10 47.7%</td>
</tr>
<tr>
<td>$201 - 300</td>
<td>2 20%</td>
<td>1 9.1%</td>
<td>3 14.3%</td>
</tr>
<tr>
<td>Total</td>
<td>10 100%</td>
<td>11 100.1%</td>
<td>21 100.0%</td>
</tr>
</tbody>
</table>

Note. Some values do not add to 100% due to rounding.

Table 23 shows the summary of frequencies of research duration in years for both 17 funded and 13 unfunded proposals in 1992 and 1994. About 59% of the funded proposals took 3 years. About 57% of both funded and unfunded proposals had proposed to take 3 years.

Table 24 summarizes the frequencies of the sustainable agriculture research cooperators coded from 1992 to 1994. There were more proposals with one to three cooperators among the unfunded proposals representing 25 (46.3%). Table 24 indicates that funded proposals were more likely to have a greater number of cooperators.
Table 22

Comparison of Funded and Unfunded Proposal Origins, 1992 to 1994

<table>
<thead>
<tr>
<th>States</th>
<th>Funded (N=32)</th>
<th>Unfunded (n=54)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Florida</td>
<td>4 16.7</td>
<td>8 25.0</td>
<td>12</td>
</tr>
<tr>
<td>Georgia</td>
<td>4 16.7</td>
<td>7 21.9</td>
<td>11</td>
</tr>
<tr>
<td>Tennessee</td>
<td>2 8.3</td>
<td>5 15.6</td>
<td>7</td>
</tr>
<tr>
<td>Arkansas</td>
<td>6 25.0</td>
<td>3 9.4</td>
<td>9</td>
</tr>
<tr>
<td>North Carolina</td>
<td>5 20.8</td>
<td>4 12.5</td>
<td>9</td>
</tr>
<tr>
<td>Texas</td>
<td>3 12.5</td>
<td>5 15.6</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>24 100.0</td>
<td>32 100.0</td>
<td>56</td>
</tr>
</tbody>
</table>

Note. Table 22 represents only those states that had frequencies of 10.2% and above, either of funded or unfunded proposals.

Table 25 shows that most of the principal investigators were professors from universities. Table 25 also indicates that more proposals submitted by professors were funded (62.5%) than submitted by practitioners (37.5%). But also among the unfunded proposals, 57.4% were submitted by professors while 42.6% were by practitioners. However, the number of proposals by practitioners (farmers, extension
Table 23

Comparison of Funded and Unfunded Proposal Duration in Years, 1992 and 1994

<table>
<thead>
<tr>
<th>Years</th>
<th>Funded (N=21)</th>
<th>Unfunded (n=32)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>1 year</td>
<td>2 11.8</td>
<td>1 7.7</td>
<td>3 10.0</td>
</tr>
<tr>
<td>2 years</td>
<td>3 17.6</td>
<td>4 30.8</td>
<td>7 23.3</td>
</tr>
<tr>
<td>3 years</td>
<td>10 58.8</td>
<td>7 53.8</td>
<td>17 56.7</td>
</tr>
<tr>
<td>4 years</td>
<td>2 11.8</td>
<td>1 7.7</td>
<td>3 10.0</td>
</tr>
<tr>
<td>Total</td>
<td>17 100.0</td>
<td>13 100.0</td>
<td>30 100.0</td>
</tr>
</tbody>
</table>

Note. Table 23 shows the research period in years for 1992 and 1994. Information was not available for 1993. There was no information on research period on 4 funded and 19 unfunded proposals.

$X^2$ value = 1.514, P value = .469

specialists, and research scientists) from research centers and institutes was considered substantial.

**Summary of Objective 3**

In Objective 3, the theme, cropping systems, had the highest frequency among the funded proposals. The variable farming practices, the category, integrated research, and
Table 24

Comparison of Funded and Unfunded Proposal Cooperators, 1992 to 1994

<table>
<thead>
<tr>
<th>Number of cooperators</th>
<th>Funded (N=32)</th>
<th>Unfunded (n=54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>31.2</td>
<td>46.3</td>
</tr>
<tr>
<td>4-6</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>46.9</td>
<td>42.6</td>
</tr>
<tr>
<td>7-9</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>21.9</td>
<td>11.1</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Column percentage.

$X^2$ value = 2.741, P value = .254

the occupation of professors were most prevalent variables among the funded proposals. Among the unfunded proposals, the theme cropping system and the sustainable agriculture practice "farming practice," and the category experimental research were the most prevalent variables among the unfunded proposals. The occupation emphasized among the funded proposals was that of professor, while practitioner was most common among the unfunded proposals. The variables number of research cooperators and duration of research, were emphasized equally among funded and unfunded
Table 25

**Comparison of Funded and Unfunded Proposal Principal Investigator Occupations, 1992 to 1994**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Funded (N=12)</th>
<th>Unfunded (n=54)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Professor</td>
<td>20 62.5</td>
<td>31 57.4</td>
</tr>
<tr>
<td>Practitioner</td>
<td>12 37.5</td>
<td>23 42.6</td>
</tr>
<tr>
<td>Total</td>
<td>32 100.0</td>
<td>54 100.0</td>
</tr>
</tbody>
</table>

**Note.** Column percentages.

$X^2$ value = .216 ,  $P$ value = .642

proposals. Concerning research origin, Arkansas had the highest frequency of funded proposals, while Florida, and Georgia had the highest frequency of unfunded proposals. It was therefore, concluded that except for the variable, number of research cooperators and duration of research, the two groups of funded and unfunded proposals were different. The two groups were different in the variables: research themes, occupation of research investigator, research categories, sustainable agricultural practices, and research origin.
Objective 4

The fourth objective of this study was to compare the research themes emanating from the funded proposals with the themes prescribed to the researchers by the Southern SARE council. In 1992, 1993, and 1994, the Southern SARE council prescribed ten themes to guide researchers in the preparation of sustainable agriculture research and education proposals (Table 26).

Descriptive statistics (frequencies) were used to describe the themes of each funded proposal. The 11 funded proposal themes were compared with the 10 themes prescribed by the Southern Region SARE Council (Table 26).

In Table 26, seven of the ten SARE recommended themes were represented in the 32 funded proposals. Four additional themes were introduced by researchers and they were: cultural practices, marketing research, integrated cropping systems, and cropping systems. Eleven themes from the 32 funded proposals were coded and described. However, the four additional themes from the proposals were a modification of the recommended SARE themes by either redefining, adding, or eliminating some earlier SARE sustainable agriculture terminologies. As stated earlier, more research emphasis was placed on those themes that focused on animal systems (31.3%), cropping systems (21.8%), and biological input (12.5%) (Tables 2 and 26).
### Comparison of SARE Recommended and 32 SARE Funded Research Proposals, 1992 to 1994

<table>
<thead>
<tr>
<th>SARE Council Themes</th>
<th>32 Funded Proposal Themes</th>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Pollution prevention</td>
<td>(1) Pollution control</td>
<td>12</td>
</tr>
<tr>
<td>(2) Biological implications</td>
<td>(2) Biological input</td>
<td>4</td>
</tr>
<tr>
<td>(3) Multiple land use</td>
<td>(3) Multiple land use</td>
<td>1</td>
</tr>
<tr>
<td>(4) Animal systems</td>
<td>(4) Animal systems</td>
<td>10</td>
</tr>
<tr>
<td>(5) Agroforestry systems</td>
<td>(5) Agroforestry</td>
<td>1</td>
</tr>
<tr>
<td>(6) Educational conference</td>
<td>(6) Sustainable agriculture education</td>
<td>1</td>
</tr>
<tr>
<td>(7) Impact assessment</td>
<td>(7) Impact assessment</td>
<td>2</td>
</tr>
<tr>
<td>(8) Multiple use of forage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9) Fish/Wildlife</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10) Conservation/Tillage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Extra Themes from the 32 Funded Proposals**

<table>
<thead>
<tr>
<th>Thematic Areas</th>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Integrated cropping system</td>
<td>2</td>
</tr>
<tr>
<td>(2) Cultural practices</td>
<td>1</td>
</tr>
<tr>
<td>(3) Marketing research</td>
<td>1</td>
</tr>
<tr>
<td>(4) Cropping systems</td>
<td>7</td>
</tr>
</tbody>
</table>

**Total** 32
Summary of Objective 4

The results for Objective 4 showed that funded proposal authors adhered to the themes prescribed by the SARE council. However, there was more emphasis placed on some themes than others. The theme of animal systems research was the most prevalent among funded proposals. Cropping systems was an added theme and was among the most emphasized themes within the funded proposals.

The emphases placed by researchers are good indicators of the themes that the SARE council should stress in their request for sustainable agricultural research proposals. The themes and other variables most emphasized should be prioritized and restricted to numbers that have the highest influence on sustainable agriculture. This study identified animal systems and cropping practices to have been the variables that were most emphasized among the funded proposals (Table 26).
CHAPTER V
SUMMARY AND CONCLUSIONS

Purpose and Objectives

The primary aim of this exploratory research was to describe and compare funded and unfunded sustainable agriculture research proposals submitted to the Southern Region SARE program for the period between 1992 and 1994. Descriptions and comparisons of variables were based on the following selected characteristics: themes, sustainable agriculture practices, research categories, and the funds required for research.

The study also sought to describe and compare funded and unfunded research proposals on: research location (state), occupation of principal investigator, number of research cooperators, length of research period, and research budget. These eight characteristics were used in this study to:

1. Describe the 32 funded proposals.
2. Describe the 54 unfunded proposals.
3. Compare the 32 funded and the 54 unfunded proposals.
4. The fourth objective sought to compare the 11 funded proposal themes with the 10 SARE Council prescribed themes.
Procedure

The population of this study was the 567 SARE proposals submitted to the Southern Region SARE program for funding from 1992 to 1994. A census of 32 funded proposals and a simple, random sample of 54 unfunded proposals were used for this study. QUALPRO Database Manager was used to process the data from the text for coding. After coding, QUALPRO generated the frequencies and cross tabulations of various variables from the text. Content validation and coder reliability were assessed through a pilot study by two experts (see Appendix A).

The researcher's competency level in delineating the proposal contents and coding procedure was determined. The researcher's content codes and procedure of coding were cross referenced with those of the experts through the results of the pilot study (see Appendix B). The researcher's performance was above the originally set standards, and after discussing and harmonizing the areas of discrepancy with the experts, the researcher proceeded with the actual coding.

Descriptive statistics were used for all the objectives of this study. Frequencies were calculated for the variables among the funded and unfunded proposals. These variables included: research themes, sustainable practices, research categories, length of research period,
Findings

The summary of the findings are arranged by objective.

Objective 1

The results obtained from Objective 1 involved the description of funded proposals on content themes, sustainable agricultural production practices, the categories under which the research was conducted, the budget applied for, and the states where the research was conducted. In addition, duration of research and number of research cooperators, together with the occupation of principal investigators, are described under Objective 1 of this study.

Eleven specific themes were initially described from funded proposals. These themes were combined to form four main themes that included: cropping systems, animal systems, sustainable agricultural education, and biological input themes. These four themes reflected the core of agricultural topics on which funded proposals focused. The research objectives were drawn from these themes and
sustainable agricultural production practices pertinent to these themes were studied.

During the period under study, funded proposals placed most emphasis on animal systems research. The second most emphasized theme was cropping systems research, followed by the theme on biological input.

Cropping practices took precedence over other sustainable agricultural practices. Cropping practices included those production activities that involve whole farm grain/halage production, cover crop integration into conservation production systems, and multi-cropping. Other cropping practices included raising warm season forage grasses as rotations for sustaining profitable peanut production. Cropping practices entail modification of crops, such as cotton, into cover crops with residue rotations and conservation tillage.

Cropping practices also involve inter-cropping small grains such as wheat and oats with leguminous crops like lupin to reduce use of synthetic nitrogenous fertilizers. Principally, cropping practices are focused cultural practices that the producer (farmer) maximizes to make farming practice feasible.

Organic matter input was the second most emphasized sustainable agricultural production practice. This practice focused on the utilization of animal and plant remains as nutrients for raising crops and animals.
Organic matter, if well utilized, aids in smothering weeds, conserving soil moisture, and maintaining soil temperature. Maintenance of crop residues on soil surface after harvest is one of the most effective means of reducing soil erosion.

Utilization of animal wastes, such as poultry, swine, and dairy wastes, as soil amendment has a great potential in the Southern United States. Organic nitrogen sources for raising vegetables, such as sweet potatoes, would cut down on intensive use of synthetic nitrogenous fertilizers. This reduction in the use of synthetic nitrogenous fertilizer would decrease leaching of nitrates to surface streams while use of poultry litter would replace synthetic nematicides in the control of nematodes. This system of organic farming reduces the use of synthetic inputs such as pesticides and fertilizers that predispose the environment to degradation.

The goals for research found in the SARE proposals on utilization of organic matter were twofold. The first goal was to help in the safe disposal of animal waste and rainfall runoff from poultry and pig house roofs. The second was to use the products of the decomposed and mineralized organic matter as a source of nutrients for both crop and animal production.

Considering the variable, sustainable agricultural practices, economic consideration (of various sustainable
agricultural activities) was the third most prevalent variable. Economic activities were geared to evaluate the economic benefit of using improved forages and other uncommon crops in the Southern United States in the control of pests like nematodes in cotton. They also were meant to compare the cost benefit of using recycled paper mulch in production as an alternative to black plastic mulches. Another important consideration was on the economies of animal waste utilization as a source of nutrients for growing cultivated crops and animal forages. The investigators sought to quantify the value of animal waste, like poultry litter, as an alternative to synthetic nutrients, and also to determine the profitability of using alternative production systems, e.g. organic farming, as an alternative to conventional farming methods. Assessment of the impact of beneficial insect populations on organic farms was also a farming practice that was given economic consideration.

Sustainable agricultural practices, cropping practices, organic matter utilization, and economic consideration emphasized the need for a collaborative, integrated, and multi-disciplinary approach to sustainable agricultural research. The frequency of funding for those proposals submitted under the integrated research category was much higher than all the others, except for the experimental research category (Table 4). In this study,
integration denoted multi-disciplinary and multi-location approaches to sustainable agriculture research. Integration of animal wastes, cover crops, and biological antagonists in the control of pests and diseases are important features of integrated research systems. The multi-disciplinary component of integrated research requires engaging more than one research investigator.

These proposals that took three years had the highest frequency among the funded proposals. Proposals from Arkansas, followed by North Carolina, received the highest levels of funding. The majority of these proposals were submitted by professors as principal investigators.

It may be reasonable to suggest that proposals by professors more often were funded than those from practitioners due to the fact that they may have had more resources, such as computers, equipped libraries, graduate students who assist in research, fellow professors, and technicians who provide assistance for research. In addition, the professors may be motivated by their professional tenureship that requires them to do research. Professors may have a higher level of training as compared to farmers and some extension specialists (practitioners). The scientists at research centers and institutions might have similar training as professors but lack other resources, like graduate students, and may not be in close proximity to well-equipped libraries.
Based on the results obtained for Objective 1, it may be reasonable to argue that the proposals that were funded in 1992 to 1994 had included and placed more emphasis on the following variables as compared to other variables in the same groupings. The following variables had the highest frequencies among the funded proposals:

1. Research themes, objectives and topics emphasizing animal systems.
2. Farming practices that placed most emphasis on cropping practices for sustainable agriculture.
3. Integrated or experimental research methodology.
4. Three years duration of research project.
5. Research topics that emphasized identified problems in certain states, such as Arkansas.
6. Multi-disciplinary research proposals written by four or more cooperators, including the principal investigator.
7. The principal investigator as a professor.

**Objective 2**

Based on the results obtained for Objective 2, cropping and animals system research categories were together equally emphasized among the 54 unfunded proposals. Conservation tillage as a theme fit very well under either research in cropping or animal systems. Seed
bed preparation and maintenance of good soil tilth were some of the conservation tillage practices employed in the production of forages and cultivated crops. It may, therefore, be reasonable to consider conservation tillage as a variable under both animal and cropping systems, which makes sustainable agriculture education the third most emphasized theme among the 54 unfunded proposals.

The variable, cropping practice, was most emphasized among the 54 unfunded proposals. Organic matter input and sustainable agriculture education were almost equally prevalent and were second after cropping practices. Pollution control was another important practice emphasized in the unfunded proposals.

The variable, experimental research, was the most prevalent research category under unfunded proposals (62.9%). Integrated research system was the second most emphasized research category (20.4%), while demonstration, impact assessment, and sustainable agriculture education each were found in fewer than 10% of the unfunded proposals. The majority of these proposals were received from 12 of the 15 states covered by the Southern Region SARE program.

Florida, followed by Georgia, submitted the highest number of unfunded proposals. Most unfunded proposals proposed to take three years, and the highest number of proposals were submitted in 1994. An average of four
cooperators per project was the most prevalent number of research cooperators. A majority of the unfunded proposals were written by two to six cooperators, and professor was the most prevalent occupation.

The content analysis of the 54 unfunded proposals showed that the category, experimental research, was more emphasized than integrated research system. Experimental research placed most emphasis on designs such as Latin-square, Randomized Block Designs and other multi-factor research designs in the generation of information. Integrated research placed emphasis on incorporation of animal and cropping systems in the research process. Information from integrated research is deemed important in the promotion of sustainable agriculture, and low emphasis on integrated research might have contributed to the proposals not being funded.

Another factor to consider was the emphasis on cropping practice. Emphasis on cropping practices and organic matter utilization was not as pronounced among the unfunded proposals as it was among the funded proposals. The highest frequencies of unfunded proposals were received from Florida (Table 11). Among the 54 unfunded proposals, multiple land use and cultural practices were not considered. Multiple land use or utilization of the same piece of land for different purposes (e.g., recreation and fishing) was considered as an economic practice. The
researchers considered cultural practices as important in the promotion of sustainable agriculture. Cultural practices would promote sustainable agriculture if researchers could develop technologies that reduce excessive use of pesticides and encourage conservation of soil and water for plants. Exclusion of these variables from research proposals may have contributed to their being unfunded.

**Objective 3**

The results obtained for Objective 3 compared the contents of funded and unfunded proposals on research content theme, sustainable agriculture practices, emphasized research categories, amount of funds requested, research location, length of research period, number of research cooperators, and the occupation of the principal investigators. Cropping systems had the highest frequency of themes among both the funded and unfunded proposals, followed by animal systems.

The integrated research category was the most prevalent category among the funded proposals, while experimental research category had the highest frequency among the unfunded proposals.

Over the 3-year period, Florida submitted the highest number of proposals, followed by Georgia. The highest
number of funded proposals, however, was received from Arkansas, followed by North Carolina.

Concerning the origin of proposals, Arkansas and North Carolina had the highest number of proposals funded while Florida and Georgia had the highest number of unfunded proposals. A further examination of the proposals from the states two highly funded and the two most unfunded states, indicated that average proposals from Arkansas and North Carolina emphasized similar variables concerning sustainable agriculture practices, themes, categories, research period, number of cooperators, and the occupation of the principal investigators. A similar trend was showed in the unfunded proposals from Florida and Georgia, except for research category where proposals from Florida and Georgia placed most emphasis on experimental research. Funded proposals from Arkansas and North Carolina placed most emphasis on both integrated and experimental research systems.

The highest number of funded proposals took 3 years, and also those proposals with four cooperators assisting the principle investigator had the highest frequency among the funded proposals. The same trend was observed among the unfunded proposals where the highest number of proposals took 3 years and the highest frequency of four cooperators per project assisted the principal investigator. The frequency of both funded and unfunded
proposals was highest for those by professors than those by practitioners.

Unfunded proposals placed most emphasis on experimental research where information on appropriate experimental designs was stressed while integrated research was most emphasized among the funded proposals where the investigators sought to conduct research on agricultural production practices that would promote sustainable agriculture in the Southern Region.

From these results, it might be reasonable to argue that integrated research methodology was emphasized during evaluation of research proposals by the Southern SARE Council because the type research methodology was the only major discrepancy found between funded and unfunded proposals.

Objective 4

The results obtained for Objective 4 regards the comparison of SARE council recommended themes with the themes emanating from the 32 funded proposals.

The Southern Region SARE Council had prescribed ten themes to guide the sustainable agriculture research authors. From the content analysis of the funded proposals, 11 themes were identified.
Seven themes were similar to those prescribed by the Southern Region SARE Council and four were new. These four were a modification of the SARE themes either by redefining, adding, or eliminating earlier sustainable agriculture terminologies. Additional themes from funded proposals included: integrated cropping systems, cultural practices, marketing research, and cropping systems research. Multiple use of forages/grasses, fish/wildlife, and conservation tillage were themes from the council that did not appear among the funded proposals.

Conclusions

Based on the findings of this study, the following conclusions were drawn:

1. Animal systems research theme had the highest frequency and was emphasized by 31.3% of the funded proposals and about 22% of the unfunded proposals. These findings agreed with the emphasis placed on dairy, poultry and swine industries in many states in the Southern United States.

2. On the variable cropping practice, the highest frequency was among the funded proposals (22.5%), while the same variable was emphasized by only 14.3% of unfunded proposals.
Most of the funded proposals were those that included the integrated and experimental research categories. This conclusion was based on the findings that 43.8% of the proposals placed emphasis on the integrated research category, while 62.9% of the unfunded proposals placed emphasis on the experimental research category.

3. Both funded and unfunded proposals had the highest number of proposals requesting 3 years of research; 61.3% of the funded and 56.3% of the unfunded proposals. Among both funded and unfunded proposals, an average of four research cooperators per proposal was the highest frequency calculated (Tables 8 and 16).

4. On the variable, principal investigator’s occupation, the occupation of professors had the highest frequency among both funded and unfunded proposals. The occupation practitioners was the second (Tables 9 and 17). This second group, was considered substantial because, as indicated earlier in this study, sustainable agriculture places emphasis on a multi-disciplinary and multi-location research approach. As compared with professors, it may be reasonable to argue that practitioners have limited resources. Examples of such resources include: secretaries, computers, equipped libraries, and graduate students who assist in research. Professors may have relatively higher training and, at the same time, their
tenureship includes a research component which places them at an advantage over practitioners in proposal writing.

This study has revealed many variables that are pertinent to the study of sustainable agriculture. However, considering the amount of resources required and the quality of results envisaged, it may be reasonable to prioritize and concentrate on a few identified variables influencing sustainable agriculture. Among the variables most emphasized in this study were the themes emphasizing animal systems research, the integrated research category, three years of research period, and four or more research cooperators representing different relevant disciplines. Collaboration in research among producers, professors, research scientists, and extension specialists is an integral part of integrated research.

This interdisciplinary approach to sustainable agricultural research is critical because "sustainable agriculture" is a nebulous terminology that requires blending of various relevant paradigms in an attempt to be more focused.

This study shows that sustainable agriculture is a system rather than a set of technologies developed for application anywhere, at any time. This dynamism calls for constant review of the existing farming practices and generation of new technologies as the existing ones become obsolete. The inclusion of farmers in the planning and
execution of sustainable agriculture research offers both security and a faster rate of adoption of the new technology because the farmers develop a stake in the change. It is, therefore, reasonable to conclude that education on sustainable agricultural production practices is continuous and the research for sustainable production systems has to be more rigorous and collaborative and multi-disciplinary in nature.

It is therefore recommendable, that more collaborative research among farmers, practitioners, and professors be encouraged in order to promote faster technological adaption by the farmers, utilize the best research capabilities from the professors, and exploit the technological methods available from practitioners (extension education). Another important factor to consider when funding proposals is the transfer of sustainable agriculture technology to the ultimate users using the most appropriate educational methods.

Recommendations

The following recommendations are based on the findings of this study:

1. The SARE Council should set a priority for shorter funding cycles so that more proposals can be funded within a given time.
2. The SARE council should conduct further research to recommend priority sustainable agriculture research themes and practices for the Southern Region.

3. There should be a periodic review of both the funded and unfunded proposals as a guide for future planning.

4. The SARE Council should place more emphasis on sustainable agriculture education research methodologies to promote faster adaption of the available sustainable agriculture technologies.
REFERENCES


Southern Region SARE Project. (1993). Louisiana State University: Agriculture Experimental Station.


APPENDIX A

EXPERT CREDENTIALS

Expert One

Education:
Degrees: Ph.D., May 1992, Louisiana State University, Baton Rouge
  Major: Agricultural Extension
  Minor: Agronomy (Soil fertility)
M.S., December 1985, Louisiana State University, Baton Rouge
  Major: Extension Education/Agronomy
  Minor: Entomology
B.S., October 1982, University of Natural Resources, Paramaribo, Suriname
  Major: Plant and Animal Science

Experiences:
  Responsibilities: Developing educational material related to ground water and drinking water issues, target audience in various pollution prevention programs, writing competitive grant proposals in the field of water quality, and evaluating implemented
programs and operating procedures for the continuation of pollution prevention as interagency/private sector parish educational programs.

January 1992-August 1992, Postdoctoral Research, Louisiana State University, Department of Agronomy and International programs.

Responsibilities: Statistical analysis and preparation of material for publication regarding land application of primary papermill wastes and assisted in grant proposal writing.

Professional Presentations and Publications:


**Expert Two**

**Education:**

Degrees: Ph.D., Louisiana State University 1982-1986

Major: Extension and International Education

Minor: Plant Science

Dissertation: Analysis of Factors Influencing the Agricultural Research Delivery System in Liberia

M.S., University of Hawaii, 1976-1978
Major: Agronomy and Soil Science

Thesis: Ultisoil Suitability for Oil Palm Production in Hawaii, Thailand, Cameroon, Liberia and the Philippines

B.S., University of Liberia, 1971-1974

Major: General Agriculture

Experiences:

July, 1994-Present, Project Director. Southern University/United States Agency for International Development Democratic Governance Project. Management and Coordination of a 3-year $7.7 million project with the government of Zambia.


Duties and Responsibilities: Planning and coordinating short-term training, assist with developing and implementation of proposals and programs, editing the quarterly newsletter "FOCUS," and assessing nutrient uptake and aluminum tolerance levels in forages.

May 22-June, 1992, Consultant. United States Agency for International Development (USAID), Kampala, Uganda.
1986-1990. Director, Central Agricultural Research Institute (CARI), the National Research Institute, Suakoko, Liberia.

Duties and Responsibilities: Supervised and assisted in planning, organizing, implementing, monitoring, and evaluating adaptive and applied agricultural research.

Awards:
1971, University of Liberia, Academic Scholarship, Food and Agricultural Organization Scholarship, for Undergraduate Studies, B.S.
1976, United States Agency for International Development Fellowship for graduate studies, M.S.
1977, United States Agency for International Development Fellowship, for Soil fertility Course
1982, United States Agency for International Development Fellowship, for Graduate Studies, Ph.D.

Publications:

Professional Presentation:


## APPENDIX B

### CODING VERIFICATION

**Summary of Results of Validation and Reliability Pilot Study**

<table>
<thead>
<tr>
<th>Coder</th>
<th>Codes from the sample proposals</th>
<th>Omissions/Disagreement</th>
<th>% Agreement</th>
<th>Mean variable coding agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st expert</td>
<td>13 13 13 10 11 7 14 18</td>
<td>3 2 1 2 0 3 0 0</td>
<td>76.9 84.6 92.3 80.0 100 57.1 100 100</td>
<td>86.5</td>
</tr>
<tr>
<td>Researcher</td>
<td>16 15 14 12 11 10 14 18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd expert</td>
<td>13 14 11 9 9 7 16</td>
<td>3 1 2 3 2 3 2</td>
<td>76.9 92.8 81.8 66.7 77.8 57.1 87.5</td>
<td>77.2</td>
</tr>
<tr>
<td>Researcher</td>
<td>16 15 13 12 11 10 18</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

114
The analysis was based on the experts’ coded characters emanating from the pilot sample proposals. The expert’s codes were compared with those of the researcher. The researcher’s codes agreed with 86.5% and 77.2% of the codes from the two experts. This level of coding for the researcher was above the two-thirds (66.7%) minimum required achievement level before the actual coding, as set at the beginning of the study. However, each disagreement and/or omissions between individual experts and the researcher was discussed and agreed upon before the actual coding.
The following terms were described from the funded and unfunded sustainable agriculture proposals, 1992 to 1994. These are the same terms that were used in the regrouping of variables, especially in Objective 3.

**Terms**

**Cropping practice**
- cultural practices (e.g., land preparation, cropping intensity)
- multiple cropping
- cover cropping
- relay planting
- strip cropping
- mixed cropping
- fallowing

**Organic matter input**
- utilizing of plant and animal remains e.g., mulch, poultry litter, and decompost birds or other animals in production

**Economic consideration**
- application of economic principles in the selection
of sustainable agriculture practices. Example, the economic benefits of replacing synthetic nitrogenous fertilizers with leguminous plants in pasture production, the economies of replacing conventional farming practices with organic farming practices.

**Sustainable agriculture education**
- transfer of research-based agricultural technologies to ultimate consumers through publications (journals articles, periodicals, newsletters, and posters), personal contacts (field days, workshops, seminar, and field visits), mass media (radio, video, and newspapers).

**Preservation of water quality**
- preservation of water quality for both domestic use and agricultural production.
- diversion of effluents from dairy, poultry, and pig industries from surface water streams and prevention of leaching of nitrates to the ground water.

**Waste utilization**
- use of sewage sludge and runoffs from roof tops of poultry houses for growing pastures and vegetables. Sewage provides nutrients while the runoff water is used for irrigation.

**Biological input**
- use of predators and parasites in the control of pests and diseases, and use of superior plant and animal species in production.
**Reduced synthetic inputs**
- use of organic material such as legumes to supply nitrogen to crops, use of organic mulch in place of synthetic mulch in gardening, and use of poultry refuse in the control of nematodes instead of synthetic nematicide.

**Rotation**
- growing of different species of plants, e.g. legumes and grasses in a sequence in the same piece of land over a prescribed period of time.

**Diversification**
- operating different types of agricultural enterprises under the same management in the same farm. Example, growing of hay and cereals in the same farm, and using farm manure to raise vegetables in the same farm.

**Market research**
- assembling market data of a commodity before the producers commit resources into actual production.

**Conservation of resources**
- conservation of soil and water for future sustained production by erosion control, conservation of soil moisture through good cultural practices, protection of soil, air, and water from any form of degradation.
Grazing management

- management to sustain the available grazing resources by proper stocking rates, reseeding of pastures and mixing legumes and grasses for high productivity. Included also is the gazing of pastures when they are very nutritious.

Pollution control

- practices that prevent any form of degradation of production resources.
  Example, erosion control to prevent soil erosion and contamination of both surface and ground water by farm chemicals.
- population control to prevent degradation of forests, and human settlements.
- promotion of farming practices that conserve the nutrients in the soil and prevent siltation of rivers.

Use of low cost input

- combination of production resources placing emphasis on those that give the highest returns per unit invested.
- Example, comparison of the cost of milk production by using purchased feeds or by producing the milk by growing all the feeds or part of the feeds on the farm.
Erosion control

- prevention of soil loss from farms by proper cultural practices, prevention of soil nutrient loss by proper replenishing methods.
- erosion control by use of organic mulching, growing of deep rooted plant types and judiciously adding nutrients to the soil.
## Table 27: Sustainable Agricultural Practice Frequencies in Funded Proposals, 1992 to 1994

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<tr>
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<td>1/1</td>
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<td><strong>48</strong></td>
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### Table 28

**Sustainable Agricultural Practice Frequencies in Unfunded Proposal, 1992 to 1994**

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<td>6/6</td>
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<tr>
<td>Waste utilization</td>
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<td>6/5</td>
<td>2/2</td>
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<tr>
<td>Marketing research</td>
<td>2/2</td>
<td>6/6</td>
<td>1/1</td>
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<td>3/3</td>
<td>2/2</td>
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<td><strong>Total</strong></td>
<td><strong>88</strong></td>
<td><strong>95</strong></td>
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APPENDIX E
AUTHORIZATION LETTER FROM THE SOUTHERN REGION SARE REPRESENTATIVE

DATE: June 29, 1993

MEMORANDUM

FROM: William H. Brown, Associate Director
Louisiana Agricultural Experiment Station

TO: Dr. Barbara Holt, Associate Professor
School of Vocational Education

Dr. George Bird, national director of the USDA SARE/ACE program called me today to give verbal approval to Mr. Ellis Njoka's request to access and analyze southern region program pre-proposals and proposals for his project. The only caution expressed by Dr. Bird was that the specific concepts, ideas, and technical details provided by the originators of the proposals should be treated with appropriate confidentiality. I believe that, with proper care, Mr. Njoka's proposed analysis can be conducted without compromising this need for a degree of confidentiality.

If the advisory committee approves Mr. Njoka's plan, he will need to contact Mr. Jim Gershey at 388-1766 to coordinate his review and/or duplication of the proper materials.

Please call me if you have further questions.

aw

Attachments

c: Mr. Jim Gershey (w/attach)
desk (w/attach)
Ellis M. Njoka, son of Mugera and Ciang'ombe, was born in Chuka, Kenya, on September 23, 1951. He graduated from Chuka High School in 1970 and worked as a technician at Embu Agricultural Research Center before proceeding to, by then, Egerton College where he graduated in 1978.

He was employed by the Kenya government as an assistant research officer before he joined the National Irrigation Board as an assistant agronomist in 1979. He was sponsored to the International Rice Research Institute (IRRI) in the Philippines by the Dutch government in 1981 where he earned an advanced diploma in rice production, research and communication.

In 1983, Ellis joined Egerton University as technician in agronomy department, a position he held until he graduated from Nairobi University with BSc. Honors degree in Agriculture in 1988. At Egerton, Ellis was promoted to a position of an assistant lecturer in agronomy, a position he held up to the fall of 1990 when he got a scholarship from the Rotary International of Rotary Foundation to pursue an M.S. degree at Louisiana State University in the U.S. Ellis graduated with an M.S. in agronomy in the spring of 1992 and through a Graduate Tuition Free Award from Louisiana State University, he proceeded to do his
Ph.D in Extension Education in the School of Vocational Education.

While at LSU, Ellis worked in the Departments of Agronomy and Sociology as a graduate assistant, as a consultant with the Dutch government, and in the School of Vocational Education as a graduate assistant.
DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Ellis Mbaka Njoka

Major Field: Vocational Education


Approved:

[Signatures]

Major Professor and Chairman
Dean of the Graduate School

EXAMINING COMMITTEE:

[Signatures]

EXAMINING COMMITTEE:

[Signatures]

Date of Examination: October 17, 1994