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SUSTAINABLE AGRICULTURE

Program Management, Accomplishments, and Opportunities

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The Honorable Mike Synar
Chairman, Environment, Energy,
and Natural Resources Subcommittee
Committee on Government Operations
House of Representatives

The Honorable Fred Grandy
House of Representatives

In response to your request and subsequent discussion with your offices, this report discusses the U.S. Department of Agriculture's efforts to encourage sustainable agriculture, specifically describes the Department's Sustainable Agriculture Research and Education Program, and recommends actions to improve both.

Copies of this report will be sent to the Secretary of Agriculture and other interested parties. We will also make copies available to others upon request.

This report was prepared under the direction of John W. Harman, Director, Food and Agriculture Issues, who can be reached at (202) 275-5138. Other major contributors to this report are listed in appendix II.

J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

Agriculture is beginning a new technological era. Since the early 1900s, major technological changes have made U.S. agriculture one of the world's most competitive and productive industries. Now, with such new scientific knowledge as genetic engineering and molecular biology, coupled with advancements in computer technology, U.S. agriculture is in transition. This new era has the potential to improve productivity and profitability while conserving and protecting the nation's resources and enhancing health and safety. A combination of environmental and economic pressures caused by, among other things, increased global competition and increased costs of agrichemicals, has prompted the federal government, farmers, and the agriculture industry to seek more globally competitive, profitable, and ecologically sound ways of producing food and fiber. This movement to alternative farming practices is called sustainable agriculture.

The Chairman of the Environment, Energy, and Natural Resources Subcommittee, House Committee on Government Operations, and Congressman Fred Grandy asked GAO to (1) describe the U.S. Department of Agriculture's (USDA) efforts to encourage sustainable agriculture, (2) specifically report on the Department's Sustainable Agriculture Research and Education (SARE) Program, and, if appropriate, (3) recommend actions to improve both.

Background

The SARE Program was first authorized by the 1985 Food Security Act. The Food, Agriculture, Conservation, and Trade (FACT) Act of 1990 changed the program's name from Low-Input Sustainable Agriculture to Sustainable Agriculture Research and Education. This change recognized that sustainable agriculture research is broader in scope than simply reducing pesticides and fertilizers but includes the need to enhance the economic viability of farm operations and the quality of life for farmers and society as a whole.

The 1990 FACT Act also increased the program's scope and authorized funding. The legislation discussed farmers' and ranchers' need for information on sustainable farming practices and systems that would not only enhance profitability but also conserve energy and protect the environment. It called for forging a partnership between farmers, nonprofit organizations, agribusiness, and public and private research and extension institutions through the SARE Program's research and education projects. USDA began the SARE Program in fiscal year 1988; total funding through 1992 has been $26.25 million.

Results in Brief

USDA has a number of programs to encourage sustainable agriculture, including the SARE Program, the Integrated Pest Management Program, numerous water quality programs, and the Integrated Crop Management Program. Other related Department activities are also important in helping to produce more competitive and safer food and fiber. Some USDA agencies have been involved in some aspects of sustainable agriculture for many years, while others are implementing new programs or redirecting existing programs.

Notwithstanding these positive efforts, the responsibility for these programs is fragmented among several under and assistant secretaries. No single entity is charged with overseeing and coordinating all of these activities. In addition, USDA currently has no policy on sustainable agriculture to provide clear and comprehensive direction for the nine agencies involved. As a result, SARE Program goals are sometimes in conflict with other program goals and program coordination varies among agencies. The Congress addressed this situation in the 1990 FACT Act by mandating the establishment of two councils to oversee and coordinate sustainable agriculture programs at USDA. However, as of July 1992, one council had just been established by departmental regulation and the other, established in 1991, has spent most of its efforts on organizational issues.

Although USDA did not request funding for the SARE Program until 1991, the Congress began funding the program in 1988. Even with delays in implementing the program, SARE Program officials have made progress, funding 183 projects. Their management of the program at the regional and project levels has successfully involved often opposing entities, including farmers, nonprofit organizations, agribusiness, and public and private research and extension institutions. The SARE Program has been a catalyst in increasing interest in and acceptance of sustainable agriculture by individuals and institutions.

While SARE managers have accomplished much, GAO found limited guidance from the national office to the regional offices for project monitoring and for reporting program results. In addition, there was little dissemination of project results at the regional and national levels.

Principal Findings

USDA's Management of Sustainable Agriculture

USDA has numerous programs and activities that address various aspects of sustainable agriculture. Its research agencies—the Cooperative State Research Service (CSRS) and the Agricultural Research Service—are incorporating sustainable goals into their research activities. The agencies that educate and provide technical assistance to farmers—the Extension Service and the Soil Conservation Service—are including sustainable practices in their teaching and planning activities. While sustainable agriculture is being developed in many ways throughout the Department, management is fragmented among nine agencies headed by four assistant secretaries and two under secretaries. In addition, some activities include participation by agencies outside USDA, such as the Environmental Protection Agency. USDA issued a policy on sustainable agriculture in 1988 that expired the following year. Now these activities are operating without a departmental policy to guide their efforts and use of resources.

Without a departmental policy, SARE Program goals conflict with some agricultural programs. For example, the SARE Program encourages farmers to develop comprehensive crop management systems to optimize chemical use, including pest management techniques and crop rotations. However, USDA's commodity programs, which support farmer income, emphasize maximizing production, often through maximum use of chemicals alone.

Several senior USDA officials told GAO there was little coordination among sustainable agriculture programs. This lack of coordination may present opportunities for duplication and limit opportunities to share knowledge. For example, although legislation directs that USDA's water quality research include sustainable farming and integrated crop production systems, GAO found little evidence of coordination between the SARE Program and the Department's Water Quality Initiative. In the 1990 FACT Act, the Congress mandated the establishment of two councils: (1) the National Sustainable Agriculture Advisory Council (NSAAC) to coordinate and oversee the many USDA sustainable agriculture programs and (2) the Agricultural Council on Environmental Quality (ACEQ) to coordinate environmental policy. However, as of July 1992, NSAAC had not met and the ACEQ has met primarily on organizational issues.

SARE Program Accomplishments and Opportunities

The SARE Program has funded 183 projects with about $39 million in combined federal and public and private matching funds through 1991. However, USDA was slow to request funding for the SARE Program, and its funding requests have continually been lower than the amount allocated by the Congress. Despite the delay in funding, the program has successfully involved farmers, nonprofit organizations, agribusiness, and public and private research and extension institutions in each of the regions during project review and selection. In addition, the SARE Program has increased interest in and acceptance of sustainable agriculture by researchers and producers, interactions between researchers and farmers, and systems research.

Because this program provides information important to farming's impact on the environment, it is important that project results have wide dissemination. Although GAO found effective information dissemination at the local level for the projects it reviewed, regional and national offices generally do not synthesize and disseminate the results of SARE research projects. In addition, GAO found the regions do not have a uniform system for reporting program activities to the national office. However, in August 1992 USDA officials told GAO that, as a result of GAO's work, they were establishing such a system. Finally, although SARE Program managers follow CSRS grant procedures and rely on the Single Audit Act for funds control, CSRS representatives believe these actions may not be sufficient to ensure that SARE Program funds are used as intended. The USDA's Office of the Inspector General has identified these grant procedures as an area of concern and plans to initiate an audit of this area.

Recommendations

To ensure more focus and coordination among agencies involved in sustainable agriculture and to better achieve the anticipated benefits of a new era of technology, GAO recommends that the Secretary of Agriculture (1) establish a departmental policy for sustainable agriculture and direct the under and assistant secretaries to develop goals to implement that policy and (2) ensure the active participation of both councils in coordinating sustainable agriculture programs, as required by the FACT Act. GAO also recommends that the Secretary of Agriculture direct SARE Program management to provide guidance to regional offices to improve program monitoring and wider information dissemination.

Agency Comments

As agreed with the requesters, GAO did not obtain written agency comments on this report. However, GAO discussed the facts in the report

with senior USDA officials in CSRS and those responsible for SARE, who agreed with their accuracy. Their comments have been incorporated where appropriate.

Contents

Abbreviations

ACEQ	Agricultural Council on Environmental Quality
AFSIC	Alternative Farming Systems Information Center
ARS	Agricultural Research Service
ASCS	Agricultural Stabilization and Conservation Service
EPA	Environmental Protection Agency
ERS	Economic Research Service
ES	Extension Service
CSRS	Cooperative State Research Service
FACT	Food, Agriculture, Conservation, and Trade Act of 1990
GAO	General Accounting Office
NAL	National Agricultural Library
NSAAC	National Sustainable Agriculture Advisory Council
SARE	Sustainable Agriculture Research and Education
S&E	science and education
SCS	Soil Conservation Service
USDA	U.S. Department of Agriculture

Introduction

To a large extent, a succession of technological innovations has substantially increased U.S. agricultural production capacity during this century. Since the early 1900s, Americans have witnessed the dramatic results of two major technological eras in agriculture. Specifically, horses were replaced by the machines of the mechanical era from 1920 to 1950, allowing farmers to greatly increase the production capacity of U.S. agriculture as well as its markets worldwide. Similarly, the chemical era that followed the 1950s further increased the agricultural productivity and competitiveness of U.S. farmers by increasing their ability to control pests and disease through the use of increased agrichemicals. Experts now suggest that new knowledge in areas such as molecular biology and genetic engineering, and advances in computer technology, are beginning to set the stage for yet another era of technological innovation. This new era could witness improvements in the production capacity of agriculture and its profitability, along with better conservation and protection of the nation's resources and enhanced health and safety. This new technology is often called sustainable agriculture.

As figure 1.1 shows, technological innovations such as those that occurred in the mechanical and chemical eras typically affect productivity slowly at first, then at an accelerated pace as the technology is disseminated to all producers, and then more slowly as the gains from the innovations become fully realized. In the case of sustainable agriculture, however, the concept of productivity is broader than it has been traditionally: The effects of technological innovation may not be primarily on production capacity but equally on environmental protection, food safety, and consumer health.

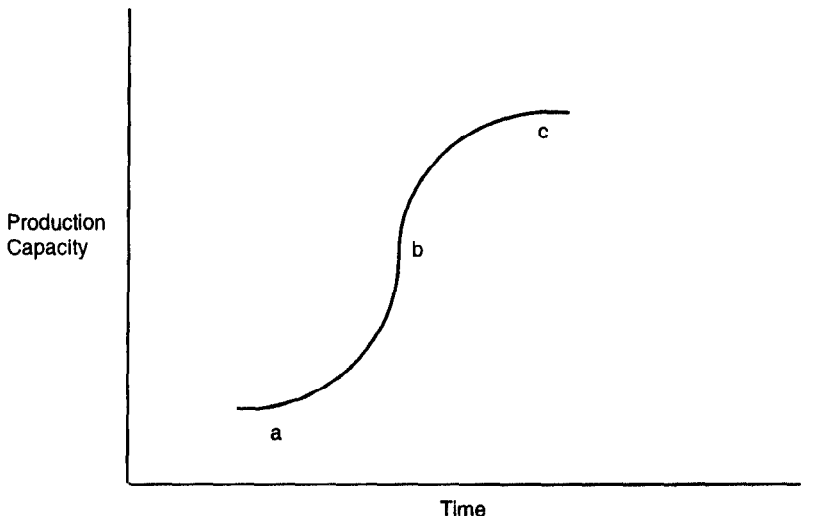
Figure 1.1: Technological Changes in Agriculture

1800-1920, Horsepower era: Early farming practices using power provided by humans and horses produced a limited quantity of food, primarily for farmer's own consumption or consumption by local communities.

1920-1950, Mechanical era: Introduction of farm machinery such as tractors reduced labor and greatly increased productivity.

1950-1980, Chemical era: A range of synthetic pesticides and fertilizers were added to mechanical innovations, again increasing productivity.

1980-2000+, Sustainable era: Increased understanding of genetic engineering and biological systems, among other things, has been added to the advances of the mechanical and chemical eras. These technologies have the potential to increase U.S. agricultural productivity and competitiveness, enhance the environment, and improve food safety and quality.



[a]Innovation begins slowly, little effect on productive capacity.

[b]Use of innovation accelerates, increasing productive capacity.

[c]Effects of innovation on productive capacity stabilizes, setting stage for new innovation.

Source: GAO.

In its publication Technology, Public policy, and the Changing Structure of American Agriculture, the Office of Technology Assessment stated that:

Over the next 15 years, American farmers will be offered an extensive array of new biotechnologies and information technologies that could revolutionize animal and plant production. The adoption of these technologies will be critical for shoring up the United States' lagging ability to compete in the international marketplace. Indeed, 83 percent of

the estimated 1.8-percent annual increase in agricultural production needed to meet world agricultural demand by year 2000 must come from increases in agricultural yields, yields that can only be possible through the development and adoption of emerging technologies.

Sustainable Agriculture

What is called sustainable agriculture today builds upon past and current agricultural technologies. As such, sustainable agriculture is an integrated framework of technologies, practices, and systems being developed to address the environmental and economic problems facing today's agriculture. Sustainable agriculture benefits from new systems research, which combines the specialized knowledge of different disciplines to learn how all the various parts of a farm (e.g., soil, water, animals, and various crops) work together to improve production and conserve resources. Sustainable farming practices vary from farm to farm but often include crop rotations, biological pest controls, and the strategic use of animal and green manures. New fields of research, such as genetic engineering and molecular biology, are integral to research on sustainable methods. This increased knowledge of biological systems is further enhanced by the use of computer technologies for automated collection, manipulation, and processing of information.

Sustainable agriculture is still in a developmental stage and can mean different things to different people. In this report, GAO is using the definition provided by the Congress in the 1990 Food, Agriculture, Conservation, and Trade Act (FACT), which states:

> The term sustainable agriculture means an integrated system of plant and animal production practices having a site-specific application that will, over the long term: (a) satisfy human food and fiber needs; (b) enhance environmental quality and the natural resource base upon which the agricultural economy depends; (c) make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; (d) sustain the economic viability of farm operations; and (e) enhance the quality of life for farmers and society as a whole.[1]

Only continued research and application can demonstrate the success and potential of sustainable agriculture on a broader scale. However, the effects of this new era of technology on agricultural productivity, the environment, and U.S. competitiveness could be more profound than either of the previous technological revolutions.

[1]Food, Agriculture, Conservation, and Trade Act of 1990, P.L. No. 101-624, section 1603, 104 Stat. 3359, 3705 (1990).

USDA Has Numerous Programs and Activities Related to Sustainable Agriculture

Sustainable agriculture research, education, and implementation activities are under way in several USDA agencies, under various under secretaries and assistant secretaries. For example, under the Assistant Secretary for Science and Education, four agencies—the Cooperative State Research Service (CSRS), the Agricultural Research Service (ARS), the Extension Service (ES), and the National Agricultural Library (NAL)—all have programs involving various activities that contribute to sustainable agriculture. Similarly, the Soil Conservation Service (SCS), under the Assistant Secretary for Natural Resources and Environment, and the Agricultural Stabilization and Conservation Service (ASCS), headed by the Under Secretary for International Affairs and Commodity Programs, are directly involved in encouraging the use of sustainable practices by farmers.

Some of these programs involve participation by agencies outside USDA. In 1991, for example, USDA's Sustainable Agriculture Research and Education (SARE) Program and the Environmental Protection Agency (EPA) began jointly funding and administering the Agriculture in Concert with the Environment (ACE) Program, with each contributing $1 million annually. The purpose of the ACE Program is to reduce pollution caused by the use of agricultural chemicals. Chapter 2 describes USDA's overall sustainable agriculture activities in greater detail.

The Sustainable Agriculture Research and Education Program

Concerns about the environment and farmers' dependence on mechanical and chemical inputs led the Congress to include legislation, as part of the 1985 Food Security Act, for a program to research and disseminate information on alternative farming practices. This legislation resulted in the USDA's SARE Program. Legislation in the FACT Act of 1990 continued and expanded this program. In general, the goal of the SARE Program is to support research and education projects that are designed to provide farmers and others with reliable, practical information on sustainable farming practices.

Sustainable Agriculture Legislation

The 1985 Food Security Act and the 1990 FACT Act instituted and continued the SARE Program, respectively.[2] The legislation mandates scientific research to increase the state of knowledge on agricultural production systems that are profitable, competitive, compatible with the environment, and safe. The Secretary of Agriculture is directed to conduct needed

[2]Food Security Act of 1985, P.L. No. 99-198, sections 1461-1471, 99 Stat. 1354, 1562-1566 (1985); Food, Agriculture, Conservation, and Trade Act of 1990, P.L. No. 101-624, sections 1619-1629, 104 Stat. 3359, 3733-3743 (1990).

research and extension projects, demonstrate technologies, and conduct education programs. Program goals include directly involving farmers and ranchers in projects; promoting a partnership between farmers, nonprofit organizations, agribusiness, and public and private research and extension institutions; and transferring practical, reliable, and timely information to farmers and ranchers on sustainable farming practices and systems.

The 1990 legislation changed the name of the initial program in the 1985 Food Security Act from Low-Input Sustainable Agriculture (LISA) to Sustainable Agriculture Research and Education, expanded the program's scope, and increased its authorized funding. The 1990 legislation has three chapters: chapter 1 replaced the 1985 provisions with the basic procedures used to operate the SARE Program; chapter 2 added provisions for research and education on integrated resource and crop management; and chapter 3 added provisions for sustainable agriculture technology development and transfer. To date, only chapter 1 has been funded.

USDA's Response to the SARE Legislation

Legislation to establish the SARE Program was passed in 1985, and in January 1988 the Secretary of Agriculture issued a policy memorandum supporting research and education programs and activities on alternative farming systems. This memorandum also gave the Assistant Secretary for Science and Education responsibility for the program. This policy expired the following year. Operation of the SARE Program began in 1988 when the Congress appropriated $3.9 million. The Congress continued appropriations for fiscal years 1989 and 1990 at $4.5 million per year without a request for funding from USDA. For fiscal years 1991 and 1992, USDA requested $4.5 million per year, while the Congress appropriated $6.7 million per year. Total program funding for fiscal years 1988 to 1992 has been $26.3 million.

National and Regional Organization of SARE Program

Nationally, the SARE Program is overseen by CSRS with the cooperation of ES and participation by various other USDA agencies, especially ARS, SCS, and NAL. A national office, located at CSRS in Washington, D.C., develops guidelines, distributes funds to regions and is the central office where regional coordinators report. A charter to establish a National Sustainable Agriculture Advisory Council, required by the 1990 FACT Act, to promote, coordinate, and guide the program was signed by the Secretary on May 7, 1992.

Regionally, the program is administered by four host institutions: (1) the University of Nebraska-Lincoln (North Central Region), (2) the University of Vermont (Northeast Region), (3) Louisiana State University (Southern Region),[3] and (4) the University of California (Western Region). Each region has an administrative council that selects the host institution and regional coordinator; establishes goals, priorities, criteria, and procedures for project selection; appoints technical and other reviewers to evaluate proposals; and makes regional decisions on project selection and funding. Day-to-day operational decisions are made by a regional coordinator at each of the four host institutions.

Objectives, Scope, and Methodology

The Chairman, Subcommittee on Environment, Energy, and Natural Resources, House Committee on Government Operations, and Representative Fred Grandy asked GAO to review the SARE Program and USDA's efforts to encourage sustainable practices. As agreed with the Congressmen's offices, our objectives were three-fold. We were to

- describe USDA's efforts to encourage sustainable agriculture at the Department level;
- review the SARE Program; and
- if appropriate, suggest ways to improve USDA's sustainable agriculture activities and the SARE Program.

To accomplish the first objective, we obtained from the Department a list of its activities involving sustainable agriculture and examined its role in managing and supporting these activities. For the second objective, we determined (1) how USDA allocated its SARE funding, (2) what types of projects were funded in each region, (3) how projects are selected and program funds distributed within the regions, (4) results of the SARE Program, (5) how results have been disseminated to farmers, (6) who has participated in SARE Program management and projects, and (7) how the program is coordinated with other related activities in the Department (such as USDA's Water Quality Initiative). To accomplish the third objective of improving USDA's sustainable agriculture activities and the SARE Program, we spoke to agricultural experts, reviewed documents, and brought together a panel of representatives from agribusiness, private organizations, and government to discuss sustainable agriculture issues and opportunities for new technologies.

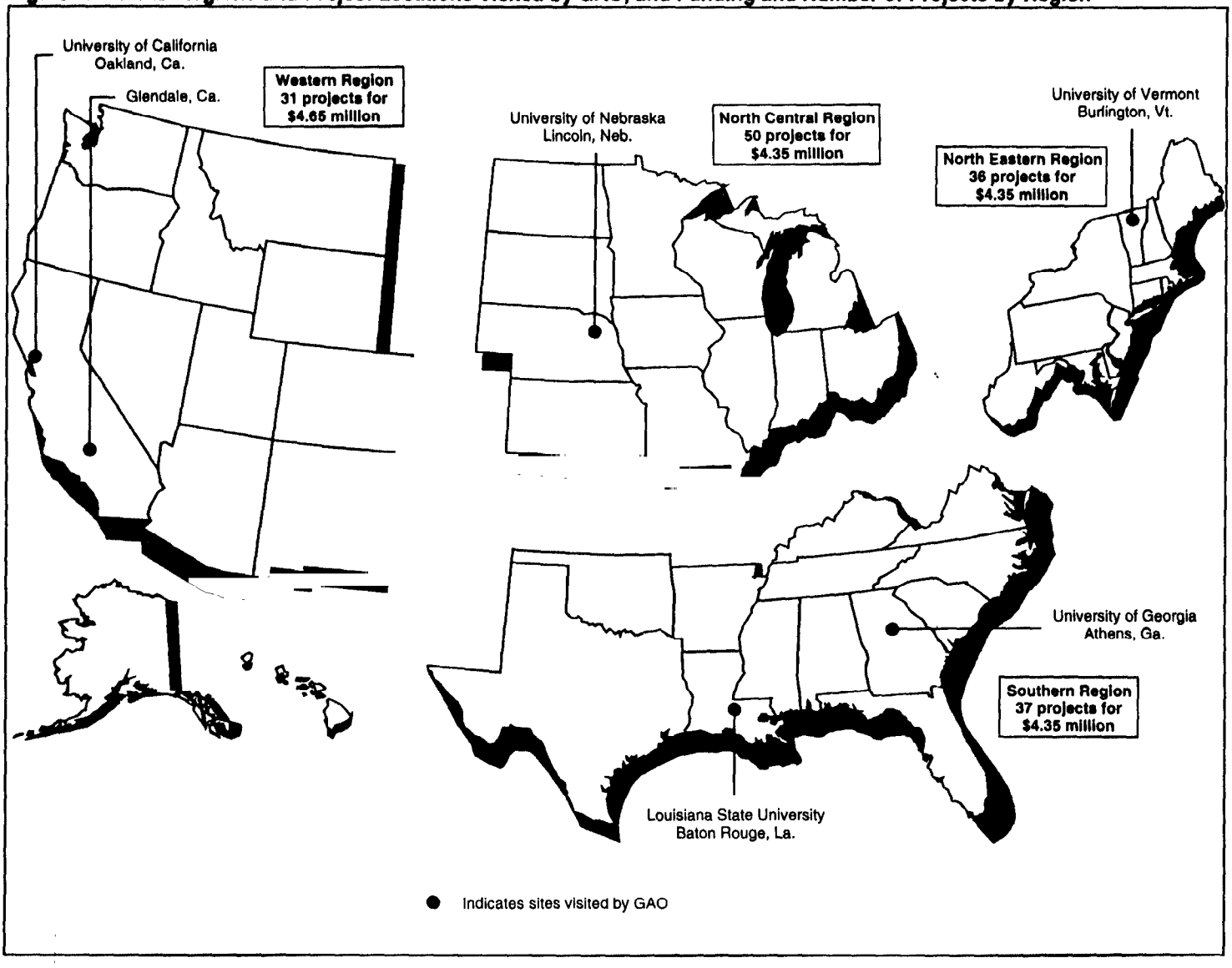
[3]The University of Georgia was the host institution for the Southern Region until 1991.

In general, our methodology consisted of reviewing program and project information and interviewing officials at the national, regional, and project levels. This included headquarters offices of the Assistant Secretary for Science and Education, Assistant Secretary for Natural Resources and Environment, and officials in CSRS, ES, NAL, SCS, ARS, ASCS, EPA, and the SARE Program; offices of the four regional host institutions; and selected projects. We also obtained information and reports from ERS and from various farm, environmental, and research organizations.

We also performed case studies of a judgmentally selected sample of national and regional SARE projects. We selected three national projects to distribute information on sustainable agriculture and 10 regional projects (representing all project categories). In selecting these projects, we considered their type, status, and duration; amount of SARE funding; and location. For each project we obtained information on project selection, funding, disbursements, information dissemination, and coordination. We did not evaluate the research findings of any SARE projects, nor did we perform a financial audit of the SARE Program.

We visited four regional project sites located in Wisconsin, Vermont, Louisiana, and Oregon. Detailed information on four case study projects is provided in appendix I. In addition, we visited the four regional host institutions and program offices in Washington, D.C., shown on figure 1.2.

Figure 1.2: SARE Regions and Project Locations Visited by GAO, and Funding and Number of Projects by Region



We performed our review from June 1991 through February 1992 in accordance with generally accepted government auditing standards. As agreed with the requesters, we did not obtain written comments on a draft of this report from the Department of Agriculture. However, we discussed the information in our report with senior USDA officials responsible for the SARE Program, including the Associate Administrator and Deputy

Administrator, CSRS, who agreed with its accuracy. Their comments have been included where appropriate.

USDA's Efforts to Encourage the Use of Sustainable Agriculture

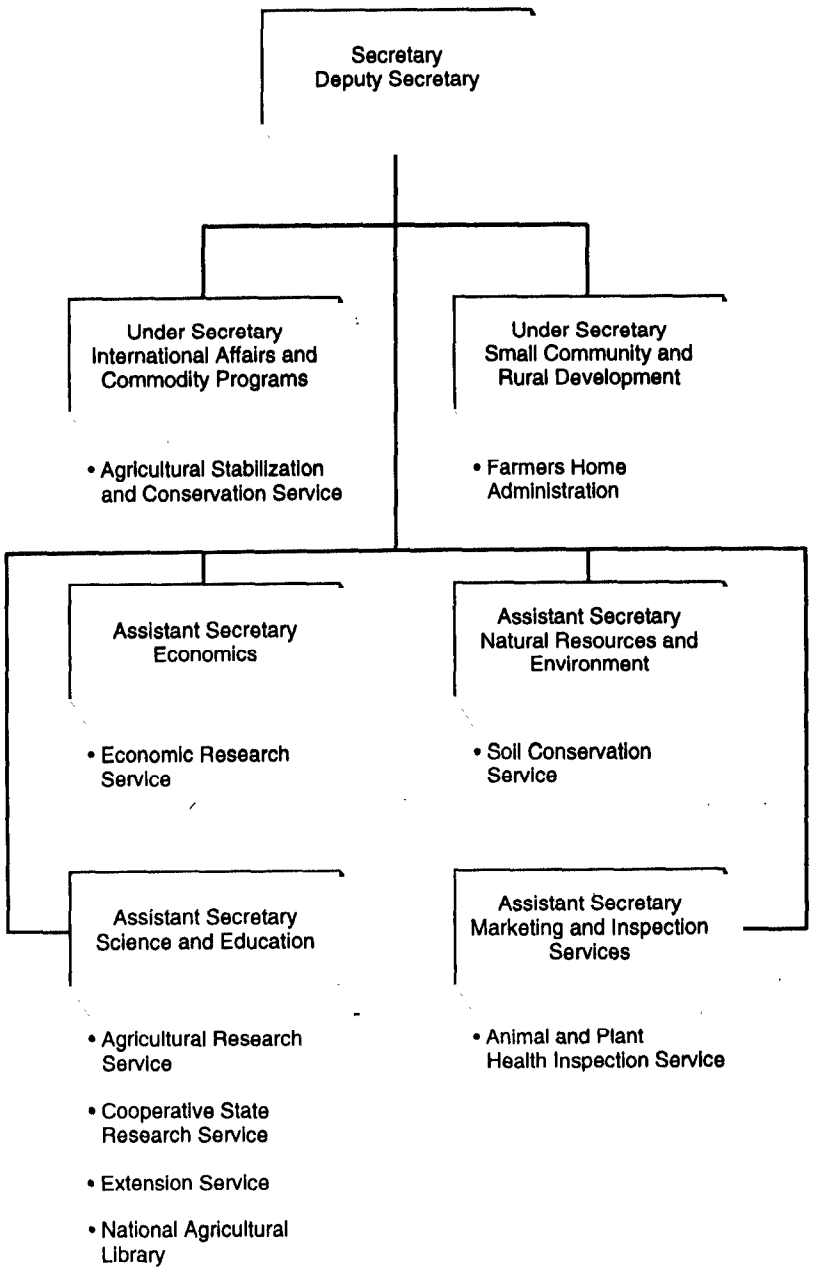
USDA has numerous programs that involve either research on, education for, or implementation of sustainable practices. Recognizing the importance of sustainable agriculture, USDA's 1991 Yearbook of Agriculture states that agriculture's new challenge is to provide adequate food and fiber without jeopardizing the nation's natural resources. USDA's Office of Budget and Program Analysis reported proposed spending for all Department sustainable agriculture activities for fiscal years 1991 through 1993 to be about $265.1 million per year on average.

While USDA has a number of programs to encourage sustainable agriculture, the Department's management of these programs is fragmented. The sustainable agriculture programs are managed by a number of under and assistant secretaries with no single entity charged with overseeing or coordinating the entire issue. Coordination is generally the responsibility of the individual program managers. In addition, USDA currently has no official policy on sustainable agriculture to focus these efforts, which has resulted in some programs within USDA having conflicting goals. Fragmented management of this issue, without a policy to guide the Department's efforts, raises concern that sustainable agriculture resources may not be used and leveraged most effectively.

Several USDA Agencies Have Programs Contributing to Sustainable Agriculture Activities

USDA has several agencies implementing programs that play a role in encouraging the use of sustainable agriculture. As shown in figure 2.1, nine agencies under four assistant secretaries and two under secretaries are involved in sustainable agriculture programs.

Figure 2.1: Under and Assistant Secretaries and Their Agencies With Sustainable Agriculture Programs at USDA



The following section describes sustainable agriculture programs managed by various under and assistant secretaries:

- Assistant Secretary for Science and Education (S&E). All four agencies under this Assistant Secretary are involved in sustainable agriculture. S&E Agricultural Research Service conducts research to develop integrated, whole-farm sustainable agricultural systems as well as essential components of sustainable systems. S&E's Cooperative State Research Service is the lead agency in implementing the SARE Program with the involvement of ES, ARS, NAL, ERS, and the State Agricultural Experiment Stations, as well as EPA. S&E's Extension Service's involvement in sustainable agriculture includes, among others, integrated pest management, soil testing and fertility management, soil conservation, water quality, natural resource management, and farm management. S&E's National Agricultural Library has established an Alternative Farming Systems Information Center (AFSIC) in response to the Food Security Act of 1985 that provides a wide range of information services to persons interested in sustainable agriculture. The number of inquiries received by AFSIC has increased tenfold from its first year in 1988 until October 1990.

  In addition, USDA's Water Quality Initiative involves the efforts of the agencies above plus seven other USDA agencies, six federal agencies outside of USDA, the State Agricultural Experiment Stations, and the State Cooperative Extension Systems. The activities of the initiative include developing, testing, and providing to farmers crop and livestock management systems that reduce the risk of agricultural chemicals reaching water supplies, particularly groundwater.

- Assistant Secretary for Natural Resources and Environment. Under this Assistant Secretary, water and soil conservation have been goals of Soil Conservation Service for more than 50 years. SCS provides farmers with a wide range of expert technical assistance to develop farming systems. With the advent of the 1985 Food Security Act, SCS has increased its efforts in sustainable agriculture and has included new conservation practices for its handbooks on Nutrient Management Standards and Pest Management Standards that recognize many of the key elements of sustainable agriculture.
- Assistant Secretary for Economics. Under this Assistant Secretary, the Economic Research Service provides economic analyses of agricultural resource and technology issues at both national and regional levels. ERS has recently joined with the SARE Program to implement an initiative to fund projects to measure the economic, environmental, and social impacts of sustainable agriculture. This initiative addresses, among other things, the void in existing data to adequately capture the differences between sustainable and conventional farming practices and the lack of measurable

indicators of the environmental impacts of the different farming systems. Economic outcomes to be examined in this initiative include impacts on global competitiveness, crop and livestock production, farm income, and market prices.

- Assistant Secretary for Marketing and Inspection Services. The Animal and Plant Health and Inspection Service under this Assistant Secretary has several biological control programs under way targeted at specific pests, including the gypsy moth and Africanized honey bee. According to USDA, expenditures for fiscal year 1990 for such projects are about $10 million, up from $3 million in 1985.
- Under Secretary for International Affairs and Commodity Programs. Through its Integrated Crop Management Program, the Agricultural Stabilization and Conservation Service provides financial support to a limited number of farmers as they adopt farming practices that reduce application of agricultural chemicals. In this program farmers must follow a written plan that will reduce pesticide or fertilizer use. ASCS requires development of plans by ES or SCS experts or by a qualified private consultant. In addition, ASCS has other activities, such as permitting a legislated amount of flexibility to price support programs by allowing farmers some latitude in selecting crop rotations. ASCS also provides cost-share assistance for measures, such as animal waste-control facilities, that enhance the sustainability of agriculture by protecting the quality of water.
- Under Secretary for Small Community and Rural Development. The Farmers Home Administration helps individual farmers develop, conserve, and properly use their land and water resources and abate pollution by providing soil and water loans.

Collectively, these sustainable agriculture activities could help to bring about a better understanding of new farming practices and technology that may in turn help to alleviate some of the economic and environmental resource problems facing modern agriculture.

Department-Level Management of Sustainable Agriculture Programs Is Fragmented and Lacks Policy Direction

Although coordinating councils were established by the FACT Act, responsibility for the sustainable agriculture issue remains fragmented among various USDA agencies. No individual or entity within USDA is responsible for managing and coordinating all of these sustainable agriculture activities. In addition, the Department has no current policy to guide its sustainable agriculture activities. Because of the lack of a comprehensive policy with goals for all agencies involved, individual program goals sometimes conflict.

USDA's Management of the Sustainable Agriculture Issue Is Fragmented and Uncoordinated

USDA's responsibility for sustainable agriculture activities is fragmented organizationally among the nine agencies involved. According to USDA officials, program managers are responsible for coordinating their respective programs. This approach has left the Department with no single entity responsible for coordinating all of USDA's sustainable agriculture activities. In a recent GAO report entitled USDA: Revitalizing Structure, Systems, and Strategies (GAO/RCED-91-168, Sept. 3, 1991), we pointed out that USDA faces several forces of change and among those are environmental conflicts over farming practices. In addition, the report noted that USDA's organizational structure, basically unchanged since the 1930s, is not responsive to these new challenges and that organizational mechanisms are necessary to coordinate and integrate USDA's diverse responsibilities in cross-cutting issues. Sustainable agriculture is an example of a cross-cutting issue that lacks an organizational mechanism to coordinate and integrate various agencies' responsibilities. For example, we were told by senior USDA officials that in a recent budget meeting with another agency on a sustainable agriculture initiative, USDA had present many people representing many programs who knew little about each other's programs. The outside agency, having one person to represent its programs, easily became the leading force in the negotiations.

USDA's program-level management approach to the sustainable agriculture issue has generally resulted in little coordination between the SARE Program and other departmental programs with related goals. Having a system or mechanism to coordinate programs with similar goals helps ensure that unnecessary duplication is not occurring, that knowledge is shared, and that resources are being used most efficiently. However, one Deputy Assistant Secretary said that coordination for sustainable agriculture programs is left to the discretion of program managers. For example, we looked at the coordination between SARE and the Water Quality Initiative, which share the common goal of changing farm

production practices to benefit the environment. However, we found little evidence that these programs are working together in planning and implementing their activities. Our 1990 report entitled Agriculture: USDA Needs to Better Focus Its Water Quality Responsibilities (GAO/RCED-90-162, July 23, 1990) pointed out that the SARE Program was not included in USDA's water quality planning. This situation has not changed. In addition, agency officials told us that effective coordination with agencies that cross the boundaries of different assistant secretaries was even more difficult.

A senior manager involved in directing the water quality initiative told us he does not believe that water quality and SARE goals are the same. He said water quality focuses on groundwater and technological changes to better protect groundwater, such as the use of satellites and lasers to analyze soil; whereas SARE focuses on biological and management changes, such as crop rotations. In contrast, a senior SARE Program official believes the Water Quality Initiative and the technology it can develop are very much a part of the broader scope of sustainability that SARE is addressing. However, officials we spoke to did cite one project involving soil testing for nitrogen (a major water pollutant) where the two programs will be working together soon. Water quality officials have asked SARE officials to have their regional review panels participate in the project by reviewing and making recommendations for funding projects to develop reliable soil tests.

The 1990 FACT Act mandated the formation of two councils to provide oversight to and coordination of sustainable agriculture programs: the National Sustainable Agriculture Advisory Council (NSAAC) and the Agricultural Council on Environmental Quality (ACEQ). NSAAC is expected, among other responsibilities, to facilitate cooperation and integration between USDA's numerous sustainable agriculture programs and other related activities. ACEQ is expected to coordinate and direct all environmental policies and programs. These councils could provide the coordination and focus needed to ensure the effectiveness of USDA's sustainable agriculture programs, but as of July 1992 neither council has addressed sustainable agriculture coordination. ACEQ was established on February 21, 1991. A USDA official on the council stated that it has spent most of its time on issues related to its organization and has recently begun to address wetlands issues. To date ACEQ has not developed an agenda for its future activities, but USDA officials told us that ACEQ will consider cross-cutting issues such as sustainable agriculture part of its mission. As of May 7, 1992, the Secretary had signed the charter to establish the NSAAC.

Lack of Official Policy for Sustainable Agriculture Creates Conflicting Program Goals

USDA currently has no official departmental policy to guide its sustainable agriculture activities. In 1988 the Secretary of Agriculture issued a policy statement on sustainable agriculture that stated:

> The Department encourages research and education programs and activities that provide farmers with a wide choice of cost-effective farming systems including systems that minimize or optimize the use of purchased inputs and that minimize environmental hazards. The Department also encourages efforts to expand the use of such systems.

In addition, this statement assigned the Assistant Secretary for Science and Education the responsibility for encouraging and guiding the development of research and extension programs that best meet farmers' needs for alternative farming systems. The statement went on to make each agency head responsible to implement his or her programs in ways that were consistent with the policy. Activities involving more than one agency were to be coordinated through the Department's Research and Education Committee.

However, this policy expired the following year and the Department has not issued a new policy to guide USDA's sustainable agriculture activities. Without an official policy statement, there are conflicting views on what the Department's policy is on sustainable agriculture. For example, one Deputy Assistant Secretary we spoke with said his office is informally following the expired policy statement. Yet, his office has no goals and objectives to implement this policy. However, another Assistant Secretary we spoke with said there was no policy on sustainable agriculture. Secretary Madigan, when asked during his nomination hearings prior to being confirmed in March 1991, did agree with the essence of the 1988 policy statement but has not initiated action to develop an official policy on sustainable agriculture, according to agency officials.

Furthermore, this lack of a Department policy for sustainable agriculture allows conflicting program goals, in some cases, within the Department. For example, the goals of the SARE Program encourage farmers to move toward using the least amount of chemicals necessary and employing common sustainable practices, such as crop rotations for pest control. However, USDA commodity programs, which support farmer income, encourage farmers to strive for high yields of a single program crop in order to maximize production. This goal generally requires the extensive use of agricultural chemicals, chemicals that have been associated with increasing environmental problems, such as damage to soil and water

quality. In this case, farmers are given a conflicting message that creates a barrier to the implementation of sustainable agriculture practices.

Conclusions

USDA's Department-level management of sustainable agriculture activities is fragmented. At present, no single entity is responsible for overseeing or coordinating the entire issue. Rather, a number of assistant and under secretaries all share responsibility. Under this approach, coordination generally becomes the responsibility of individual program managers. However, as we have previously reported, an organizational mechanism is necessary to coordinate and integrate USDA's diverse responsibilities on cross-cutting issues, such as sustainable agriculture. Although the FACT Act of 1990 mandated the formation of two councils to coordinate and oversee these programs, as of July 1992 neither council had yet addressed sustainable agriculture coordination.

In addition, USDA lacks a departmental policy to provide clear and comprehensive goals for the nine agencies involved in sustainable agriculture. Such a policy could make USDA's sustainable agriculture activities more effective by providing common direction for the agencies implementing these programs. Once a policy is established, agencies would then be able to develop goals consistent with this policy. In addition, resources can be used or leveraged more effectively by building on or using information developed in these programs. A clear, sustainable agriculture policy would also help reduce the likelihood that USDA programs give conflicting signals to farmers.

Recommendations

To provide clearer direction to and coordination among USDA's sustainable agriculture activities and to more effectively utilize the Department's resources, we recommend that the Secretary of Agriculture:

- Ensure the active participation of the (1) National Sustainable Agriculture Advisory Council in providing coordination of sustainable agriculture programs and (2) the Agricultural Council on Environmental Quality, which is to direct and coordinate environmental policies and programs, as mandated by the FACT Act of 1990.
- Establish a departmental policy on sustainable agriculture and instruct under and assistant secretaries to develop goals to implement that policy for sustainable agriculture. This policy should consider sustainable agriculture's interrelationship with other departmental programs and

acknowledge the trade-offs that may be necessary as agriculture becomes more productive, competitive, and environmentally sound.

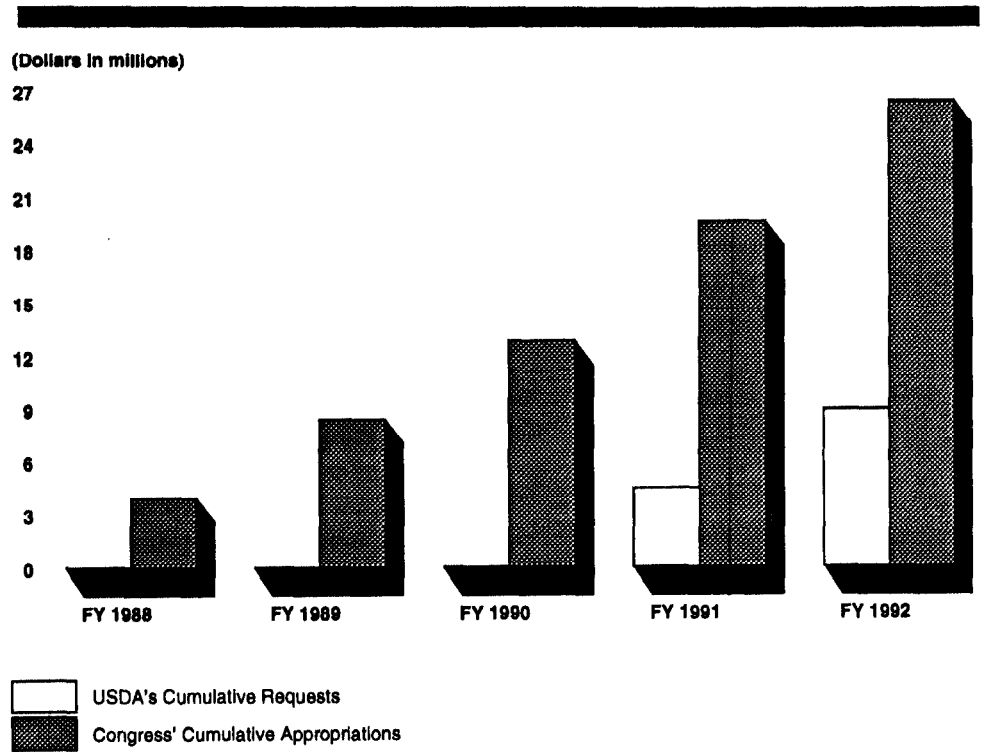
SARE Program Overview

The SARE Program has funded 183 projects with about $39 million in combined federal and matching public and private money through 1991. The national office, located at USDA's Cooperative State Research Service in Washington, D.C., provides guidance and distributes funds to the regions. The SARE Program is administered by four regional sites that review, select, and administer the individual projects according to a process that considers the specific types or categories of research to be selected.

Program Funding

Although the SARE Program was established by legislation in 1985, USDA did not begin operating the SARE Program until 1988. The Congress first appropriated SARE Program funding in fiscal year 1988 and continued funding through fiscal year 1990 without funding requests from USDA. The Department first requested funding for fiscal years 1991 and 1992 but requested less than the Congress eventually appropriated. Figure 3.1 shows that in fiscal years 1988 through 1992, USDA requested only $8.9 million, but the Congress appropriated $26.25 million.

Figure 3.1: SARE Program Funding Requested by USDA Compared With Appropriated Funding



Source: SARE national office.

In addition to the $26.25 million appropriated by the Congress, EPA provided a total of $2 million in fiscal years 1991 and 1992 combined for the Agriculture in Concert With the Environment Program, and $437,000 was received from other USDA agencies in fiscal year 1992 for a total of about $28.69 million. SARE national office records show that about $3.4 million of this total was allocated to administrative and miscellaneous costs and $25.3 million to national and regional projects and activities. The Western Region received $6.2 million, and the other three regions each received $5.9 million in project funds.

SARE representatives have leveraged program funds by attracting matching funds for projects from state and local governments and private organizations. These matching funds provide financing for projects in addition to the amount available from SARE funding alone. The SARE national office recently estimated that the program has attracted about $19

million in matching public and private funds through 1991 for regional SARE and ACE projects. According to the EPA/USDA agreement to support ACE projects, those projects awarded under ACE are managed separately from SARE Program grants; therefore, the remainder of this report discusses only the 162 projects awarded only by SARE.

SARE Project Selection Process

The regions have followed formal processes, based on both national and regional guidelines, to select SARE projects for funding. National office guidance allows regions flexibility in developing their own selection processes and priorities within the mandates of the legislation. This practice recognizes the differing agricultural characteristics among the regions. As a result, variations in selection processes exist among the regions as selection processes have evolved from 1988 to 1991. In 1991 proposals were to be evaluated for their relationship to the region's priority issues and the following national criteria: relevance to program goals, appropriate methodology for the proposal's objectives, relationship to integrated systems research or impact assessments, functional integration of multiple organizations, direct involvement of farmers, and feasibility of attaining the proposal's objectives. Table 3.1 briefly describes how the regions typically select projects.

Table 3.1: Project Selection Process

Step	Activity
Proposal submission	In response to the regions' requests, researchers and organizations submit proposals for funding describing proposed projects.
Proposal evaluation	A technical review panel appointed by the regional administrative council evaluates and ranks the proposals and reviews proposal budgets.[a]
Project selection	The regional administrative council selects proposals to be funded, reviews proposal budgets, makes budget adjustments, and allocates funding to initiate the projects.

[a]Technical panels are comprised of scientists in a wide range of disciplines: extension agents and other educators; experts in conservation of soil, water, and other natural resources; and farmers and private organizations having expertise in sustainable farming methods and systems. Administrative councils include at least one representative each from SCS, ARS, State Agricultural Experiment Stations, State Cooperative Extension Service, and private organizations and farmers with expertise in sustainable agriculture.

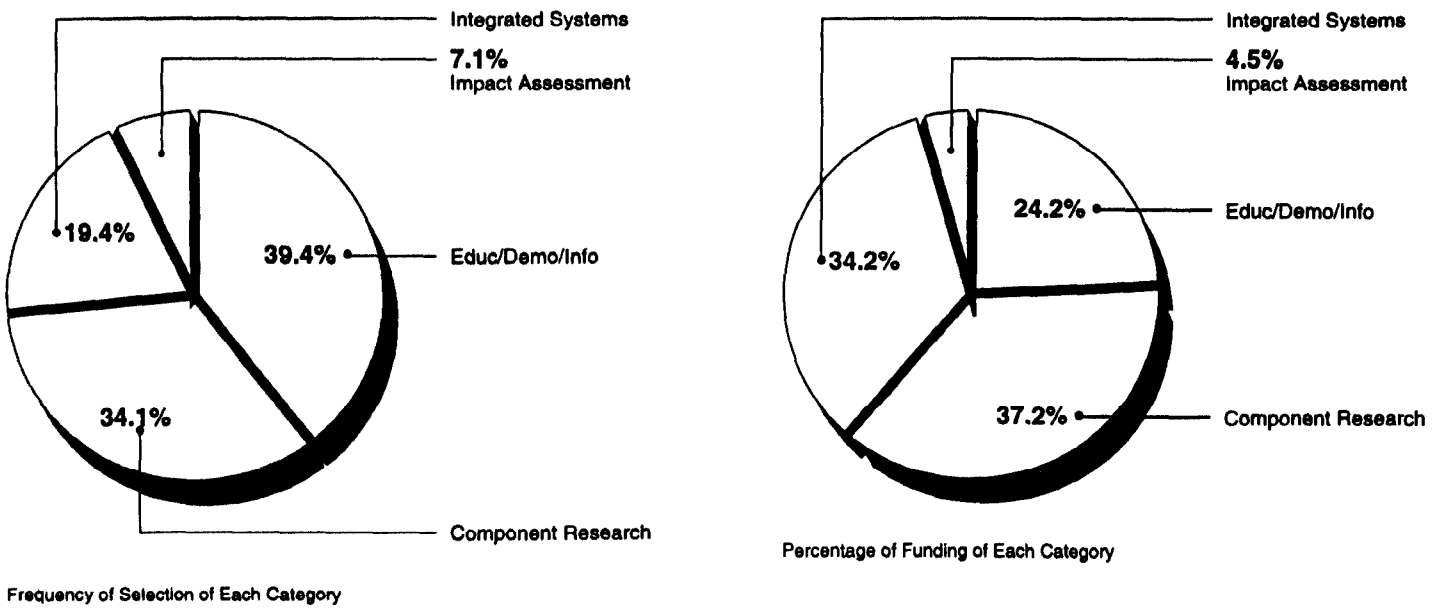
Categories of Projects Selected for Funding

Four general project categories are eligible for SARE funding:

- Educational, demonstration, or information projects (1) provide training on sustainable farming practices through conferences, workshops, and preparation of educational materials and (2) exhibit sustainable farming practices and systems on farms.
- Experimental or exploratory component research projects focus on developing or improving a specific sustainable low-input method or practice. Experimental component research projects provide data for statistical tests by comparing clearly defined variables, whereas exploratory component research test methods are not as well defined as scientific variables or as rigorously controlled. (Most of the research funded by agricultural experiment stations and the Agricultural Research Service is experimental component research.)
- Integrated-systems research examines synergistic and conflicting relationships among various aspects of farming operations and functionally integrates the findings of many research studies and direct experience into a whole-farm or natural-system context. Whole-farm-systems studies consider the management of an entire farm, or a major segment of a farm, over several years. Natural-systems studies increase understanding of the interactions among living organisms, environmental conditions, and farming practices.
- Economic or social impact assessment projects examine the economic and/or social effects of adopting sustainable farming practices and systems.

Some projects address more than one research or extension category. All projects are required to include a proposal for information dissemination of results upon completion of the project. Highest priority is to be given to integrated-systems research projects. The first two research and extension categories have been included most frequently in the projects selected. Figure 3.2 shows how frequently each SARE research and education category was selected and the percentage of SARE project funding each category received.

Figure 3.2: Frequency of Selection and Percentage of Funding for Each Category



Source: SARE national office.

Although integrated-systems projects are to receive priority, only 33 of the 162 SARE projects include integrated-systems research. SARE representatives cited several reasons for the relatively low number:

- Little integrated-systems research has been done, and the capability to do this type of research is still developing.
- Few proposals for this type of research are received, and many of them are not well designed or do not have all the elements of integrated-systems research.
- Most researchers propose component research because they are accustomed to this type of research and are better rewarded for it by their institutions.
- Organizing, coordinating, and conducting integrated-systems research requires more effort and funding because it involves scientists from

multiple disciplines and often needs to record information from more than one crop cycle.

Regional representatives are concerned about the small amount of integrated-systems research and are acting on that concern. For example, the Western Region planned to limit fiscal year 1992 SARE proposals only to integrated systems. Taking a slightly different approach, the Southern Region has funded a grant-writing workshop to help develop integrated-systems proposals and other research categories. In addition, SARE Program officials are developing a "white paper" to identify guidelines to evaluate whole-systems research proposals. A SARE official told us that, because the paper is the first of its kind, the academic community has expressed much interest in these guidelines.

Numbers and Status of SARE Projects

Table 3.2 shows the numbers of SARE projects funded through January 1992, both nationally and in each region, and their status. The SARE Program has funded 29 national projects, while the regions have funded 133 projects since the program began in 1988. As of January 31, 1992, 63 projects were completed and 99 were in process or newly funded. Of the total 162 SARE projects funded, 109 received funding for one fiscal year, 34 for 2 fiscal years, 16 for 3 fiscal years, and 3 for 4 fiscal years.

Table 3.2: SARE Projects Funded Nationally, by Region and Project Status, through January 1992

Office	SARE projects	Newly funded	In process	Completed
National	29	0	9	20
North Central Region	41	11	13	17
Northeastern Region	29	3	12	14
Southern Region	37	9	21	7[a]
Western Region	26	9	12	5[a]
Total	**162**	**32**	**67**	**63**

[a]One of these projects was cancelled.

Source: USDA, SARE national office, and regional offices.

SARE Program Accomplishments and Opportunities

The SARE Program has made progress in achieving its goals. Program goals, in general, were to support research and education projects to help farmers employ sustainable farming practices and to involve a broad spectrum of the agricultural community in the program. The program's accomplishments include funding 183 projects; establishing the regional structures that involve the participation of farmers, researchers, private organizations, and others; and increasing interest in and acceptance of sustainable agriculture and systems research. These accomplishments, however, could be further enhanced by better dissemination of project results at the regional and national levels and by improved program reporting and project monitoring.

SARE Program Accomplishments

Most of the results of the SARE projects we examined have been disseminated primarily at the local levels. The process to develop and research these projects has resulted in the involvement of farmers, ranchers, researchers, private organizations, and others. As a result, those close to the SARE Program believe it has increased interest in and acceptance of sustainable agriculture, researcher and farmer interaction, and sustainable agriculture research, including systems research.

Project Topics and Information Dissemination

The SARE projects funded to date examine a wide range of topics related to agriculture and its effects on the environment, including crop rotation, the use of cover crops,[1] tillage practices, weed and disease control processes, and waste and nutrient management. While some of these SARE projects are long-term studies, requiring several years to produce valid results, others provide existing information to farmers. We studied 10 regional and 3 national SARE projects during our review. (Brief descriptions of the objectives and results of four of the regional projects are provided in app. I.)

The 10 projects we examined have generally performed well in disseminating a large amount of information to farmers and educators at the local level. These projects have consistently included farmers in their target audiences and have disseminated project results through articles in the popular press and agricultural publications, field days, meetings, extension bulletins, videos, and presentations. For example, one project has disseminated information through (1) a quarterly newsletter received by 2,500 individuals and distributed to county extension offices; (2) annual symposia attended by farmers, research and extension personnel, private

[1]The use of cover crops can reduce soil erosion and farmers' inputs of nitrogen fertilizer.

industry representatives, and agency representatives; (3) research reports; (4) lectures, forums, seminars, and other presentations; (5) radio and television interviews; and (6) popular press articles. The project is also developing a resource guide to direct farmers to sources of sustainable agriculture information.

Broad Involvement in Project Selection and Research Activities

Farmers, ranchers, and agribusiness; public and private research and extension institutions; nonprofit organizations; and government agencies make up the four regions' administrative councils and technical review panels or committees involved with SARE. These groups have participated in administering the program, selecting regional projects, and planning and reviewing these projects. Many people we spoke to who were involved in or knowledgeable of SARE said that the most dramatic benefit of the program was the opportunity for these often opposing groups to meet and work together on setting priorities and approving proposals. They believed this has helped foster communication and a better understanding among the different groups that make up the agricultural community—an understanding that did not exist before SARE.

Table 4.1 outlines the involvement of these groups on the administrative councils, technical review panels or committees, and the 10 regional projects we studied in 1991.

Table 4.1: Participants in Administrative Councils and Technical Panels for 10 Regional Projects GAO Reviewed

	Participants		
Groups	Administrative council	Technical review panels	Regional projects GAO reviewed
Farmers/ranchers	7	23	49
Researchers/ extension personnel	19	53	99
Agents of nonprofit organizations	10	6	6
Government personnel	18	14	1

New Interest in and More Acceptance of Sustainable Agriculture

Regional representatives and project participants believe the program has generated new interest in sustainable agriculture, given sustainable agriculture more credibility, and increased farmers' consideration of these practices.

A measure of the interest in sustainable agriculture research is the amount of matching funds projects attract. As noted earlier, about $19 million has been made available through matching funds for these projects. Another measure is the response of research institutions to the program. USDA provided us with copies of letters from several major research institutions that responded to a USDA inquiry on the effects of the SARE Program on their respective institutions. Several respondents identified recent institutional changes to better accommodate sustainable agriculture research as the most noteworthy impact of SARE. For example, one university described major changes in the structure of its agriculture program and said "there was significant faculty and student interest in sustainable agriculture prior to the LISA (the predecessor to SARE) program. However, the LISA program provided a legitimacy that had not existed previously."

Sustainable agriculture has more credibility now than in the past, according to regional coordinators, panel and committee members, and project leaders we spoke to during our review. They said more farmers are implementing or considering sustainable agriculture practices, and regional representatives believe the SARE Program has played a role in this trend. Many of them also believe that the program provides credibility to sustainable agriculture and that its emphasis on farmer involvement leads to adoption by other farmers.

Increased Researcher and Farmer Interaction

Project participants told us that agricultural researchers and farmers have different interests and priorities, but the program has helped the two groups to recognize and attempt to accommodate each other's needs. For the 10 projects we reviewed, farmer input to project planning was considerable. The program's design forces researchers to pay attention to their clientele (farmers and ranchers). Some projects involve multidisciplinary teams working together with farmers. Working closely with farmers has made researchers more receptive to farmers' ideas and concerns and given them an appreciation of farmers' expertise. USDA data indicate that over 1,800 farmers have participated in the SARE Program in different capacities since its inception. This kind of farmer/scientist interaction has been rare in the past but is now seen as an integral part of the future of agriculture.

Increased Sustainable Agriculture Research, Including Systems Research

The program has caused more researchers to get involved in sustainable agriculture research, according to regional representatives. It has generated many proposals for research that have been funded outside the program. Furthermore, the program has served as an impetus to states' involvement in sustainable agriculture programs through matching funds and other program incentives. For example, a new national project developed in conjunction with the Extension Service will provide $5,000 to each state to establish sustainable agriculture demonstration farms. Since $5,000 is only a small part of the cost of a demonstration farm, states in various regions are cooperating to pool their money and establish regional demonstration farms.

Regional representatives and project participants said the program is unique in funding interdisciplinary and systems-oriented research. Interdisciplinary project teams of scientists and farmers are considering many factors instead of just a single component or the traditional concern of maximizing production. The program broadens the scope of agricultural research to include economic, environmental, and social factors relevant to farmers.

Use of Program Results and Monitoring Could Be Improved

While SARE representatives have accomplished much, the program has an opportunity to increase its impact and effectiveness if some changes are adopted. Specifically, improvements in disseminating and reporting project results regionally and nationally and increased program monitoring would increase program effectiveness and help ensure program integrity. National guidelines and systems are needed to do this.

Better Regional and National Dissemination and Reporting of Project Results Would Increase Program's Impact and Effectiveness

The 1985 and 1990 farm bills require the timely transfer of SARE research results to farmers and ranchers and the promotion of sustainable agriculture practices, but no guidelines or systems are in place for disseminating research results or for reporting results beyond the individual project level. The program relies on individual project researchers to disseminate, promote, and coordinate project results.

SARE guidelines do not discuss what systems or methods are to be used by regions for collecting, evaluating, and synthesizing research results or for disseminating research results to farmers, ranchers, and other users at the regional or national level. Although individual projects we reviewed disseminated large amounts of information on project results at the local and state levels, individual projects have limited capability to disseminate

results regionally and nationally. Thus, a project has less potential impact than if regional and national information transfer systems were used because there is no assurance that project results will be disseminated beyond the locality of the project.

Furthermore, we found no uniform system for reporting on program activities from the regions to the national office. As a result, when we asked the national office for basic data on the program, such as how many projects had been funded in the four research categories, it had a difficult time providing accurate information because each region had a different tracking system. A consistent tracking or reporting system through the regions and national office would allow for more accurate and timely accounting of program activities. However, program officials told us in August 1992 that, as a result of our work, they have begun to implement a uniform system to report program activities.

Plans to Improve Information Dissemination

The Sustainable Agriculture Network project, which started in 1989, is the program's primary national effort to summarize and publicize project results at a national level. The project's goals are to (1) help farmers, information providers such as extension agents, and researchers find the information they need to implement sustainable systems and (2) identify gaps in the information base for researchers, administrators, and other information providers. Because the project is a long-term effort, many of its components are still in the planning stages. Among these planned components is a computerized data base that could facilitate dissemination, summarization, and coordination of project results. One completed product is a handbook developed by the Northeastern Region that summarizes information from across the nation on the use of cover crops.[2] The handbook summarizes the results of hundreds of cover-cropping experiments across the country and presents practical "how-to" information to farmers with regional specificity.

Additional efforts at the national and regional levels that could improve information dissemination include the following:

- The SARE Program is developing a microcomputer-based farm decision support system known as Sustaining and Managing Agricultural Resources for Tomorrow. This system is intended to facilitate assembly of farm-level environmental, resource conservation, and economic information and to

[2]Managing Cover Crops Profitably, U.S. Department of Agriculture, the Sustainable Agriculture Research and Education Program of CSRS; Rodale Institute, Emmaus, PA.

help farmers balance economic and ecological objectives in a whole-farm planning process. The system is to be used mostly by county agents and specialists working with farmers, although farmers will have access to the system. The operation of this system will require information that may take years to develop.

- Each region allotted $25,000 in November 1991 to hire a communications specialist to develop an effective and cost-efficient way to transfer information in a usable form to farmers. Two regions have already hired specialists who are actively involved in transferring information.

Better Monitoring Would Help Ensure Program's Integrity

Although the SARE Program began in 1988, the national office has not developed any guidance or regulations for the regional offices for project monitoring. Regional offices do little monitoring of project sites. In addition, we found instances in which the requirement for progress reports from project directors was not fulfilled. Finally, CSRS officials told us the current procedures do not provide adequate assurance that SARE Program funds are used as intended.

The regions monitor projects by reviewing progress reports and by visiting sites. Annual and final progress reports are required by contracts with project grantees, but there is no requirement that regions do site reviews. Some projects had not submitted progress reports and many had not received site reviews. Although the receipt of progress reports and the performance of site reviews vary among regions, 7 of the 80 regional projects that received fiscal year 1988 or 1989 funding had not submitted any progress reports, and 56 had not received site reviews. Projects should be monitored to help ensure that results are as reported and that SARE funds are used as intended.

Regional coordinators recognize and are taking some steps now to address the need for more site monitoring. However, the national office has no requirement for site visits and regional plans to visit sites vary. For example, one region is asking administrative council members to voluntarily make site visits, while another region is assigning projects to council members to monitor. More recently we were told by program officials that in three of the four regions, projects that are renewed beyond the second year are required to have site visits. The fourth region has recently agreed to also provide such visits.

CSRS representatives said the SARE Program relies on the Single Audit Act to ensure proper use of funds.[3] The Single Audit Act does not preclude agencies from conducting their own audits or reviews in carrying out their program oversight responsibilities. CSRS representatives said they believe that reliance on the Single Audit Act alone does not adequately assure SARE Program officials that SARE funds are being used as intended. An official in USDA's Office of Inspector General told us they are aware of this situation and will be conducting an audit this year of the controls on the special grants program, which includes SARE.

Conclusions

The SARE Program has been successful in promoting sustainable agriculture, not only through its many projects, but through its ability to bring together diverse groups within the agricultural community to communicate and work together. It has also been instrumental in encouraging research institutions to become more involved in sustainable agriculture research and in the development of systems research. It has in many ways been a catalyst in this new area of agriculture.

At the same time, the effectiveness and integrity of the program could be improved. While SARE project leaders have done a good job at the local level in disseminating project results, no system exists to collect and synthesize results at the regional and national levels. In addition, no national guidance for regional project monitoring exists, and current regional monitoring varies. Consistent project monitoring by the regions would help ensure the progress and integrity of the SARE Program.

Recommendations

To increase the impact of the SARE Program, improve its effectiveness, and help ensure its integrity, we recommend that the Secretary of Agriculture direct SARE Program management to establish (1) guidance and systems to

[3]The Single Audit Act of 1984 requires state and local governments that receive between $25,000 and $100,000 in a fiscal year to have an audit in accordance with program requirements or a single audit. Entities that receive $100,000 or more in federal financial assistance must have a single audit performed by an independent auditor. Single audits must encompass all of the entity's financial operations and report whether (1) the financial statements are presented in accordance with generally accepted accounting principles, (2) the entity complied with laws and regulations that may have a material effect on the financial statements, (3) the entity has internal control systems to provide reasonable assurance that it manages federal financial assistance programs in accordance with laws and regulations, and (4) the entity complied with laws and regulations that may have a material effect upon each "major federal assistance program." Major federal assistance programs are determined by comparing the expenditures for each program to the total expenditures for all federal programs. Programs are designated as major programs when expenditures exceed $300,000 or 3 percent of total expenditures for all programs. This applies to entities that receive between $100,000 and $100 million. Thus, a SARE project that does not meet major program criteria may not be subjected to testing for compliance with laws and regulations.

collect, evaluate, synthesize, and report the results of SARE research projects at regional and national levels and (2) national standards for regional monitoring of SARE projects.

Objectives and Results of Four Regional Projects Studied by GAO

This appendix contains brief descriptions of 4 of the 10 regional projects we studied. One project from each region follows.

North Central Region Project Lnc88-10: Substituting Legumes for Fallow in U.S. Great Plains Wheat Production

The overall objective of LNC88-10 is to discover if legumes exist that could be developed and incorporated successfully into a wheat/legume production system for the Great Plains. Wheat/fallow production systems have been used for nearly a century in the wheat-producing Great Plains states. But in other wheat-producing areas of the world, cereal grain/legume companion-crop production systems are utilized to reduce erosion by keeping the soil covered, fix atmospheric nitrogen, reduce weed competition, and provide improved grazing potential. The potential of replacing fallow with legumes in the Great Plains is being tested at a number of locations from North Dakota to Kansas. The locations represent a continuum of moisture stress, from the most humid to the most arid. Farmers are cooperating to test alternative legumes (primarily black medic and sweet clover) and alternative legume management systems in large, replicated plots. Small-plot and feasibility research on black medic and other alternative legumes and production systems is also being conducted at university experiment stations. Those involved in the project on a regular basis (major participants) include researchers from North Dakota, Kansas, and Nebraska universities; a Wisconsin nonprofit organization researcher; and North Dakota and Minnesota farmers.

Among the project's results are the following:

- No one legume or legume management practice will likely be universally successful. Thus, working with individual farms is a necessity.
- Alternative legumes have been documented to use less water than traditional legumes.
- The interactions between legume and cereal growing together may prove beneficial to enhance grain quality and reduce disease susceptibility.

Northeastern Region Project Lne88-2: Improving Farm Profitability by Efficiently Using the Pasture Resource

This project's overall objectives are to assist northeastern farmers in using rotational grazing management and to further study and refine this method for conditions in this region. Permanent pastures in the Northeast typically produce only about 2 tons of moderate- to poor-quality forage per acre during a 3- to 4-month grazing season. But the Voisin method (also known as short-duration, intensive-rotational, or rational grazing) enables these kinds of pastures to produce 4 tons or more of excellent quality dry forage per acre during a 6- to 7-month grazing season. This method has been used

for many years in New Zealand, where a highly productive and profitable agriculture depends on permanent pastures that are grazed under controlled management. In contrast, many American farmers use a system of zero pasturing or year-round confinement feeding involving high equipment costs and large amounts of purchased feed and supplements, often resulting in low profitability. Experiments are being conducted in Vermont and West Virginia. Major participants in the project include researchers from Vermont, West Virginia, New York, Massachusetts, and New Hampshire universities; Vermont farmers; and video producers from a Vermont nonprofit organization.

The project has found that rotational grazing reduces the labor, feed, and equipment costs associated with conventional confinement dairy operations.

Southern Region Project Ls89-16: Development of a Low-Input Cropping System for Small-Scale Farms

Among LS89-16's objectives are (1) developing a viable vegetable sequential cropping system that is ecologically sound and minimizes the use of agricultural chemicals and (2) determining the economic feasibility of selected low-input vegetable cropping sequences for small-scale farmers. A cropping system is being developed in which various vegetable crops are planted sequentially with legumes strategically placed within the sequence to build up soil nitrogen and allow for low inputs of expensive nitrogen fertilizer. The experiment is occurring in Louisiana. Austrian winter pea, common vetch, and crimson clover are used as cover/green manure crops; and a winter legume is seeded on control plots. Nitrogen applications vary. Major participants include researchers from a Louisiana university; Louisiana farmers; and a farm manager from a Louisiana nonprofit organization.

Preliminary results include the following:

- No significant yield differences occurred among vegetable crops following cover crop treatments.
- No yield differences occurred between vegetables receiving the full recommended nitrogen rate and those receiving one-half the nitrogen rate, but reduced yields occurred with the complete elimination of nitrogen.
- Minimal insect damage was done to crops in spite of reduced insecticide applications.

Western Region Project Lw88-1: Evaluation and Design of Low-Input Sustainable Vegetable/Small Grain and Small Fruit Systems of Western Oregon and Washington

This project's objectives include (1) determining relevant biological processes of low-input agriculture for future study and (2) sponsoring major educational activities and developing sources of information on low-input agriculture alternatives. Cropping systems in the Pacific Northwest maritime region of Oregon and Washington are diverse, characterized by many high cash-value specialty crops, high inputs, and high risk. Registration of many key pesticides (especially herbicides) has been dropped for these crops, and some high-input agricultural practices have resulted in undesirable environmental side effects and in natural resource concerns. Area farmers are searching for alternative management strategies and anticipating further regulation of pesticides and fertilizers. The project organized, packaged, and distributed information on alternative agriculture from scientific and extension literature. Whole-farm case studies by interdisciplinary specialists are documenting sustainable agriculture practices in use by mixed vegetable and small fruit growers on 16 typical Pacific Northwest maritime farms, ranging in size from 10 to 2,000 acres. Farmer input to the project and information dissemination activities included conferences, forums, and focus sessions involving farmers and scientists. Information is also disseminated by a quarterly newsletter, and a resource guide is being published. Major participants include researchers from Oregon and Washington universities and an Oregon extension agent.

Project results include the following:

- Strengths and weaknesses of existing viable alternative systems were documented, and information about low-input sustainable agriculture was systematically organized from scientific and extension literature.
- Farmer innovations in alternative weed management, cover crop management, and biological control of insects were documented.
- Constraints to the adoption of sustainable agriculture practices and research problems requiring further study were identified.
- An economic analysis compared production costs for conventional and organic methods.

Major Contributors to This Report

Resources, Community, and Economic Development Division, Washington, D.C.	Luther L. Atkins, Jr., Assistant Director Daniel M. Haas, Assignment Manager Mary E. Roy, Senior Division Evaluator
St. Louis Regional Office	William H. Gansler, Evalutor-in-Charge Gary T. Brown, Staff Evaluator
Atlanta Regional Office	Kathy R. Alexander, Site Senior Steve D. Morris, Staff Evaluator

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