Sustainable Agriculture:
Cooperative Extension Service's Strategic Plan for New Mexico

Cooperative Extension Service
College of Agriculture and Home Economics

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What is in this guide

SUSTAINABLE AGRICULTURE DEFINED

Sustainable agriculture is a management philosophy and system providing for agricultural needs of current and future generations. Sustainable agriculture utilizes management practices that are profitable, environmentally sound, and beneficial to society.

THE NEED TO TEACH SUSTAINABLE AGRICULTURE METHODS

Environmental problems plague our nation today. Current and future consumers need to be aware of and understand these problems. Additionally, consumers need to be given tools to identify and prevent further problems. Making them aware of environmental issues, including issues of sustainable agriculture, will help us all become better guardians of our nation's natural resources.

Concerns about the environment relate to water quality, soil erosion and degradation, fertilizer and pesticide application, dairy containment systems, and urban sewage disposal and septic tanks. Many citizens perceive that these are serious problems in agricultural regions. Furthermore, many private and public agencies and organizations question intensive agricultural management methods. These concerns can affect agricultural policy, legislation, production methods and costs, and marketability of agricultural products. Therefore, agriculture needs to address existing and potential environmental issues from the standpoint of sustainability. Thus, sustainability has become a major driving force for agricultural education, Extension, and research.

NMSU EXTENSION'S VISION AND MISSION

The vision of NMSU Extension is to develop a comprehensive strategic plan for training Extension professionals in sustainable agriculture methods and theory. Extension also will assume leadership for teaching the fundamentals of sustainable agriculture to the state's agriculture community.

Extension's mission is to develop an integrated, multidisciplinary, multi-agency education plan that focuses on helping its clientele implement sustainable agricultural systems. In addition, Extension must design a program to meet the challenges of producing an abundant, healthy food supply while maintaining our quality of life and preserving natural resources.

EDUCATIONAL GOALS

Extension's goal is to integrate sustainable agriculture systems and solutions into existing educational programs and develop the necessary educational materials. In addition, we will provide training for Extension personnel and clientele concerned about sustainable agriculture and environmental issues.

The objectives for accomplishing this goal include:

- Examining the implications of adopting a sustainable farming system,
- Providing good stewardship of natural resources,
- Improving water quality,
- Improving the quality of life for rural communities,
- Protecting the health of workers in the food production industry,
- Promoting agricultural diversification, and
- Providing for profitable agriculture.

EDUCATIONAL OBJECTIVES

Another major goal is to streamline and improve the communication of these sustainable agriculture objectives (below) to the citizens of New Mexico.

Objective 1: Form a team to develop New Mexico's Strategic Plan for Sustainable Agriculture.

This team consists of 80 individuals representing Extension, other units of NMSU, New Mexico Department of Agriculture (NMDA), United States Department of Agriculture (USDA), National Resource Conservation Service (NRCS), the general public, non-profit organizations, agriculture producers (traditional and non-traditional), environmentalists, agribusiness and commercial agronomists, producer associations, key legislators, and politicians. Information on sustainable agriculture will be effectively communicated to clientele through a collaborative approach. One of the first steps needed is for other organizations to network with Extension and the Sustainable Agriculture Research and Education Program (SARE).

Objective 2: Develop a sustainable groundwater management system by decreasing nitrogen inputs.

- A preliminary study of chile and onion fields showed that nitrogen applications far exceeded the needs of those crops.
- Determine amount of nitrogen leaching to the groundwater and determine irrigation efficiencies to improve current management practices.
- Extension has applied for funding from SARE's Professional Development Competitive Grant to continue this initiative.

Objective 3: Develop and increase the use of sustainable agriculture management systems.

- Sustainable agriculture practices have been adopted by producers in north-central New Mexico through the efforts of the Rural Agricultural Improvement and Public Affairs Project (funded by a Kellogg grant) and the Small Farm Task Force.
- Adopt a total ecosystem approach to small farms in the north-central areas of New Mexico.
- Evaluate and incorporate specialty crops and their best management practices.
- Develop new marketing initiatives.
- Implement alternative management methods for fruit and nut growers.
- Utilize environmentally sound brush and weed management practices.

Objective 4: Identify economic and environmentally sound options for erosion-prone land.

- New Mexico has about one-half million acres of grassland enrolled in the Conservation Reserve Program.
- Weeping lovegrass has been shown to fit into an early-season grazing need, and it complements native grasses.
- Preliminary data show weight gains of up to 3 lb per day in beef calves grazing on weeping lovegrass.

Objective 5: Improve dairy effluent and waste management.

- Preliminary data was acquired to assess the impact of effluent on soil, crops, and groundwater.
- From these results, educational programs pertaining to best management practices of dairy wastes will be conducted.

Objective 6: Address existing and potential groundwater quality problems.

The Doña Ana-Sierra Hydrologic Unit project (a collaboration between Extension, the Consolidated Farm Service Agency, and National Resource Conservation Service) has addressed groundwater problems by:

- Promoting the use and improvement of best management practices for soil fertility.

- Educating producers on how to increase the efficiency of irrigation and improve water quality.

- Promoting pollution protection practices through well-head protection.

Objective 7: Seek additional funding sources for sustainable agriculture systems.

- Extension has submitted a grant proposal to the International Arid Lands Consortium for a project on the management of sustainable agronomic systems.

- Extension has submitted a proposal to the Environmental Protection Agency's environmental education grant fund for a project on water pollution.

Over the next four years, Extension needs to improve its ability to provide whole-farm and whole-ecosystem management, as well as support the infrastructure of individual communities throughout New Mexico.

Professional development and in-service training activities that already have been initiated address the following:

- Intensive agriculture management,

- Dairy containment systems (effluent and manure management),

- Groundwater containment from pesticides and nitrate-nitrogen,

- Best management practices,

- Irrigation management and scheduling,

- Integrated pest management,

- Rural-urban water usage issues, and

- Organizational and leadership skills of rural citizens and others.

INTERNAL STRENGTHS AND WEAKNESSES

Extension's ability to provide education in sustainable agriculture will be determined by the organization's strengths and weaknesses. The following lists of strengths and weaknesses are based on evaluations of ongoing Extension projects, as well as feedback from related grassroots organizations and other agencies.

Strengths

- Capable and dedicated personnel within the agricultural community in general, including Extension.

- Extension agents are well educated. All have at least a bachelor's degree, many have master's degrees, and agents pursue continuing education credits.

- The necessary infrastructure for an effective educational system already exists among producers and agricultural organizations through county agents, specialists, the Internet, mail, radio, and the news media.

- Multidisciplinary and multi-agency approaches to developing sustainable agriculture systems already exist.

- Grassroots organizations have been involved in the planning, development, and evaluation of sustainable agriculture initiatives.

- Clientele have responded favorably to Extension's invitation to membership on New Mexico's Strategic Plan for Sustainable Agriculture.

Weaknesses

- Reductions in federal and state funding are trends likely to continue over the next few years.

- Because of reduced funding, Extension is understaffed, with several vacant county agent and specialist positions.

- Funding for sustainable agriculture projects is lacking.

- Conservative citizens resist change to agricultural systems.

- The news media tends to focus on differences rather than similarities between groups, fostering conflict.

- Private and public agencies and other organizations addressing sustainable agriculture issues do not have a common understanding or definition of sustainable agriculture.

- Extension personnel are neither rewarded nor held accountable for addressing sustainable agriculture issues and problems.

- There is no inter-agency coordination of sustainable agriculture programs.

EXTENSION'S OBJECTIVES FOR SUSTAINABLE AGRICULTURE, 1996–1999

The following objectives are part of Extension's statewide plan of work, its four-year plan for educational programming.

Objective 1: Implement New Mexico's Strategic Plan for Sustainable Agriculture to create a shared sense of purpose between Extension and our partners.

Objective 2: Determine what sustainable agriculture projects will continue, identify the sustainable agriculture initiatives of related agencies, and integrate sustainable agriculture issues into Extension's education programs for staff and clientele.

Objective 3: Form multidisciplinary, multi-agency, and community task forces to address sustainable agriculture systems.

EDUCATIONAL PHILOSOPHY

Through direct interactions between people with differing priorities and viewpoints, Extension professionals will enlarge upon their own knowledge and help create many win/win solutions to the sustainable agriculture problems in New Mexico. But implementing New Mexico's program for sustainable agriculture will require that Extension target its clientele. Targeting the message to specific client groups produces results because the message focuses on particular audience needs and concerns. Results can be improved productivity, increased credibility and integrity of Extension professionals, development of a joint vision of the future, and the establishment of rapport between Extension professionals and their clients.

Extension will evaluate the success of its educational programs in sustainable agriculture through questionnaires, group discussion assessments, rating scales and checklists, and pre- and post-test results (like those conducted for the Certified Crop Advisor program).

A summary of these evaluations will be used to determine if participants have increased their knowledge of sustainable agriculture and related issues. In addition, all changes in attitudes and behavior among clients and Extension personnel will be recorded.

TERMS RELATED TO SUSTAINABLE AGRICULTURE

The terms below are intended to provide a common understanding of terms among all people who discuss sustainable agriculture issues.

Agroecology—An approach to agriculture that is sensitive to the environment and to social needs, as well as focused on the ecological sustainability of the productive agriculture system.

Alternative farming/agriculture—Agricultural systems different than from traditional farming.

Aquifer— Sand, gravel, or rock formation capable of storing or conveying water below the soil surface.

Best management practices (BMP)—Management practices that are the most effective, practical means of preventing or reducing pollution from agriculture.

Biodegradable—Capable of being broken down (decomposed) by microorganisms.

Biodynamics—An agricultural approach that takes into account the natural processes of the environment, such as decomposition.

Biological/ecological farming—A system of crop production in which the producer tries to minimize the use of chemicals for crop pests control.

Biotechnology—Tissue culture, clonal propagation, genetic mapping, and genetic engineering for the purpose of developing new crop varieties.

Compost—Organic soil amendment or mulch made from organic waste materials such as dead leaves and kitchen scraps.

Contaminant—Physical, chemical, biological, or radiological substance causing an impurity in the environment.

Ecosystem—Community of animals, plants, and the physical environment in which we live.

Hazardous waste—A solid, liquid, or gaseous substance that is classified under state or federal law as potentially dangerous, and is thus subject to special requirements for handling, shipping, and disposal.

Herbicide—Chemical used to manage undesirable plants.

Integrated pest management (IPM)—A broad, ecological approach to pest control. Pest management is coordinated with cultural practices to achieve protection from economically damaging levels of pests, while minimizing hazards to crops, human health, and the environment.

Kyusei nature farming—Organic farming that uses beneficial microorganisms to increase the microbial diversity of our soils and thus increase fertility.

Low-input agriculture— A system that optimizes the management of production inputs such as fertilizer, biocides, and fuel.

Manure—Organic material excreted from animals, used as fertilizer and organic amendment to enrich the soil.

Nonpoint source—Entry of a pollutant into a body of water from widespread or diffuse sources with no definite point of entry.

Organic—In chemistry, the carbon compounds, many of which are associated with living organisms.

Organic farming—A system that avoids or largely excludes the use of synthetic chemicals for crop production and relies on crop rotations, crop residues, legumes, green manures, and mechanical cultivation.

Organic fertilizer—A by-product from the processing of animal or vegetable substances that is used as a soil amendment.

Organic matter—Part of the soil consisting of dead or decomposing carbon compounds derived from formerly living organisms.

Organic soil—Soil containing a high percentage by weight (more than 20%) of organic matter.

Permaculture—"Permanent agriculture." A system that integrates food production, animals, people, structure, and landscape.

Pesticide—A chemical substance used to control pests.

Point source—Release of a pollutant from pipes (or other discrete sources) into a body of water.

Pollutant—A substance which, upon entry, will decrease the quality of water, soil, or air.

Regenerative agriculture—An approach to food production that emphasizes the regeneration of renewable resources.

Riparian zone—A transition area between an aquatic ecosystem and nearby, upland terrestrial ecosystem.

Toxic—Substances that in small quantities may poison, cause injury, or cause death when eaten or ingested through the mouth, absorbed through the skin, or inhaled into the lungs.

Watershed—Land area that captures precipitation and conveys it to a particular body of water.

REFERENCES

ASA. 1995. Organic farming: Current technology and its role in a sustainable agriculture. ASA Special Publication No. 46., Madison, WI.

ASA. 1985. Transferring technology for small-scale farming. ASA Special publication No. 41., Madison, WI.

Balba, A.M. 1995. Management of problem soils in arid ecosystems. CRC Press, Inc., NY, NY.

Callaway, M.B. and C.A. Francis. 1993. Crop improvement for sustainable agriculture. University of Nebraska Press, Lincoln, NE.

CSSA. 1991. Plant breeding and sustainable agriculture: Consideration for objectives and methods. CSSA Special publication No. 18., Madison, WI.

CSSA. 1989. Grazing research: Design, methodology, and analysis. CSSA Special Publication No. 16., Madison, WI.

Edwards, C.A., R. Lai, P. Madden, R.H. Miller, and G. House. 1990. Sustainable agricultural systems. St. Lucie Press, Delray, FL.

Hatfield, J.L. and D.L. Karlen. 1994. Sustainable agriculture systems. CRC Press, Inc., NY, NY.

Hang, R.T. 1993. The practical handbook of compost engineering. Lewis Publishers, Ann Arbor, MI.

Olkowski, W., S. Daar, and H. Olkowski, 1991. Common-sense pest control. The Taunton Press, Newtown, CT.

Rodale. 1992. Rodale's all-new encyclopedia of organic gardening. Rodale Press, Emmaus, PA.

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