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January-February 1993 CSAS Newsletter

The University of Nebraska-Lincoln Center for Sustainable Agricultural Systems is an interdisciplinary center formed in 1991 for the purpose of bringing together people and resources to promote an agriculture that is efficient, competitive, profitable, environmentally and socially sustainable for the indefinite future. This electronic version of the Center's bimonthly newsletter is published 10-14 days before those on our mailing list receive their hard copy. At this time there is no charge for being on our newsletter mailing list. To be added to the "hard copy" list, or for questions or comments, contact the newsletter editor, Pam Murray, Administrative Coordinator, Center for Sustainable Agricultural Systems, 221 Keim Hall, University of Nebraska-Lincoln, Lincoln, NE 68583-0949, phone - (402) 472-2056, fax - (402) 472-7904, email - CSAS001@UNLVM.UNL.EDU.

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DEFINING PRODUCTION SYSTEMS IN NEBRASKA

What are sustainable, transitional, and conventional production systems? Don't stop reading, this is not another article on the definition of sustainable agriculture! However, the question continues to haunt the literature, policy debates, and research agendas. Some of the best minds in agriculture have concentrated on this question for some time; some kind of consensus must have been reached. The 1990 farm bill defines sustainable agriculture as "... an integrated system of plant and animal production practices having a site-specific application that will, over the long-term: satisfy human food and fiber needs; enhance environmental quality and the natural resource base upon which the agricultural economy depends; make the most efficient use of nonrenewable resources and on-farm/ranch resources and integrate, where appropriate, natural biological cycles and controls; sustain the economic viability of farm/ranch operations; and enhance the quality of life for farmers/ranchers and society as a whole." While the farm bill definition and many like it are excellent overall umbrella definitions, they are not helpful for operationalizing ground level sustainable systems research.

One standard research model is the replicated experiment. Many researchers have used tillage, rotation, and chemical use test

plots to compare sustainable and conventional systems. These experiments have expanded the knowledge base of sustainable agriculture, but they lack one of the very pillars upon which sustainable agriculture rests: the "system." It is the system interaction of crop rotations, pest control, fertility, tillage practices, and livestock production that result in economic and environmental benefits. To not include the interaction effects in an experimental design is to miss the very advantage of an integrated sustainable system. Patrick Madden, associate director of the USDA SARE program, writes:

"...one proposal that was not supported contained an otherwise excellent experimental design intended to compare conventionally managed plots with 'low-input' plots. The error in the design was that the so-called low-input plots were to be managed exactly like the conventional plots, except that the chemical pesticides and fertilizers were withheld. This proposed 'low-input' treatment could be more accurately characterized as benign neglect."

Another factor that sometimes makes operationalizing difficult is that sustainable agriculture is "site-specific." A four-crop rotation in the Platte valley of Nebraska would likely be considered a sustainable practice, while a four-crop rotation in the Palouse region of Washington state is conventional.

Case studies that address the "system" and "site-specific" nature of sustainable agriculture have been important contributions, but they suffer from the inability to generalize to the population. Through an Agriculture in Concert with the Environment (ACE) grant (obtained with assistance from the Center for Sustainable Agricultural Systems), a team of UNL researchers is investigating the economic, environmental, and sociological effects of moving toward a more sustainable agriculture. The study is one of six regional studies which will be aggregated to assess the national impact of moving toward a more sustainable agriculture, thus the ability to generalize is important. With this in mind, the goal of the ACE project is to capture, on a fairly wide scale, the "system" effects of different production systems "specific" to Nebraska.

The researchers conducted a statewide survey of producers. Using a K-means cluster analysis algorithm that separates observations based on similarities of the data, the producers were categorized into four groups based on similarity of production practices. The power of using this method is that differentiation of the groups did not involve researchers' perceptions of what is sustainable or conventional. Also, criteria for differentiating one system from another were not based on any component of a system. Rather, the separation was based on the entire production system, and was data driven based on the actual production practices employed.

Besides the 60 production practices used to calculate the cluster groups, there were approximately 400 other characteristics collected. A few of the defining production and nonproduction characteristics are listed below.

Group 1: primarily anhydrous and liquid N as fertility sources; largest farm size (800 ac.); own 1/3 of farm, lease 1/3 from family; two-crop rotation (corn-sb); primarily chemical means of weed control; the most highly erodible land (HEL); some irrigation; avg. age 42; 0% membership in the Neb. Sust. Ag. Society (NSAS); no-till tillage system.
Group 2: virtually 100% anhydrous as N fertility source; 2nd largest farm size (730 ac.); own 1/2 of farm, lease from nonfamily; continuous corn; primarily chemical means of weed and insect control; virtually no HEL; virtually all irrigated; avg. age 50; 0% Membership in NSAS; virtually all feedgrain base.
Group 3: uses anhydrous, but also highest in use of green and animal manure, compost, & N fixed by legumes; 3rd largest farm size (500 ac.); own over 1/2 of the farm, lease from family; three-crop rotation (corn-sb-+); uses variety of chemical and nonchemical means of weed and insect control; some HEL; virtually no irrigation; avg. age 46; 10% membership in NSAS.
Group 4: no anhydrous ammonia used; smallest farm size (280 ac.); own virtually 100% of farm; four-crop rotation (c-alf-oats-sb); no insecticides used; some HEL; virtually no irrigation; avg. age 55; 17% membership in NSAS.

Group 1 could be thought of as transitional, Group 2 conventional, and Groups 3 and 4 as sustainable. The assignment of these labels is a hypothesis at this point. The test of this hypothesis will come in the next phase of the project when on-farm interviews, soil sampling, and other experimentation will be conducted.

Reference: Madden, J. Patrick. "Commentary: What is Alternative Agriculture?" American Journal of Alternative Agriculture 4 (1989): 32-34.

(Submitted by Kevin Bernhardt, Glenn Helmers and John Allen)

Editor's Note: For more information about this study, contact Kevin Bernhardt, Ag. Econ. Dept., U. of Nebraska, Lincoln, NE 68583-0922, 402-472-7882.

NEBRASKA ENVIRONMENTAL TRUST FUND

The Nebraska Environmental Trust, established in spring 1992, is funded with 25% of the proceeds from the Nebraska State Lottery (49.5% after 1997). The first check representing proceeds from Oct. through mid-Dec. 1993 was for $868,311. The Nebraska Environmental Trust Board is holding hearings in January and February to get public input on a draft of the rules and regulations governing allocation of these funds. This draft document states that governmental entities (including the U. of Nebraska) are eligible to submit application for funding, and that educational projects may be considered to have "clear and direct environmental benefits" -- one of the requirements. The proposed final version of the regulations will be brought before the public in a formal hearing process in April. Copies of the draft regulations and additional information can be obtained from the Nebraska Department of Environmental Quality, the Nebraska Game and Parks Commission, the Natural Resources Commission, or

from the local Natural Resources District and Soil Conservation Service offices.

SUSTAINABLE AG GRANTS FOR PRODUCERS

Farmers and ranchers in the 12-state North Central Region (NCR) can apply for grants up to $5,000 to test and demonstrate sustainable production and marketing practices. About $100,000 is expected to be available in 1994. In the first two years of the NCR Sustainable Agriculture Research and Education (SARE) program funded by USDA, 56 producer grants have been awarded for projects ranging from rotational grazing and grass studies to biological weed and pest control, low-input crop production, nutrient management, composting of manure, use of post-CRP land, and producing and marketing sweet sorghum syrup. While many of the grants have been to study on-farm problems, others have been used to sponsor educational programs and field days for producers. A fact sheet describing all previous NCR producer grants is available from the NCR SARE Office. As projects are completed and evaluated, a publication of producer reports and recommendations will be published. Below is a list of Nebraska projects:

William and Elizabeth Kleinschmit, Hartington -- Converting windrower to compost turner, allowing fertilization of more acres with existing manure and fewer purchased inputs.

Robyn Rohlfing, Plymouth -- Test plots comparing effectiveness of biological weed control in low (farm-style) and high (garden-style) intensive crop situations.

Lowell Schroeder, Stanton -- Development, construction and testing of non-chemical fly control traps for cattle in both cow-calf and dairy herd situations.

Marvin and Evelyn Lange, Fordyce -- evaluating potential of angora goats and sheep to control leafy spurge.

Gary Young, McLean -- comparing effects of alfalfa-winter rye companion crop with conventional crop rotations for weed control and yield; also has grant to evaluate controlled release of an insect to control thistle.

Don Fox, Fairbury -- evaluating cattle performance per acre of grassland and grassland production in terms of feed resource quality, quantity and possible extended grazing systems.

Applications must be submitted by 5 p.m. May 1. To request an application form, fact sheet, or more information on the program, write to NCR-SARE, 13A Activities Bldg, U. of Nebraska, Lincoln, NE 68583-0840, or call (402) 472-7081.

NATIONAL SUSTAINABLE AG COORDINATING COUNCIL

The following was abstracted from a newsletter published by the Center for Rural Affairs.

The National Sustainable Agriculture Coordinating Council is sponsoring a "national dialogue" between sustainable agriculture groups, environmental groups, progressive farm organizations, animal protection groups, farmworker groups and others to identify a set of policy proposals for which they can work together in the 1995 Farm Bill. This effort is founded on the proposition that broad public concerns about issues such as environmental protection and food quality support rather than compete with family farm and sustainable agriculture objectives. Complementary concerns include: reducing reliance on petrochemicals; use of management skills to reduce purchased inputs; opportunity to buy foods produced in a sustainable way; protection of critical wildlife habitat and erosion-prone acres; decent income and safe working conditions.

A series of workshops around the country to obtain input from farmers and grassroots activists on farm bill options will provide the basis for a large national conference in late Feb. at which the initial outlines of a common agenda for the 1995 farm bill will take shape. For information on Council activities, or to obtain the packet of papers describing the policy options under consideration for the 1995 farm bill ($4), contact the CRA, PO Box 406, Walthill, NE 68067-0406, 402-846-5428.

FEDERAL CONSERVATION POLICY IS CHANGING

Public concerns over adverse environmental effects of agriculture are influencing conservation policy in general as well as ag policy in particular. Federal wetlands policy and the debate over grazing fees on federally-owned lands are prominent examples of each. Pressure for continued decrease in the level of ag price and income supports is also affecting conservation policy. These new environmental and budgetary concerns bring ag policy to a crossroads. Maintaining the current level of conservation programs in the next farm bill may be expensive. The CRP, for example, is costing $2 billion per year, and reductions in federal income support are reducing the leverage for environmental compliance linked to farm programs. Two approaches to ag and environmental policy will likely receive greater consideration: 1) increased reliance on command-and-control measures (regulation), such as chemical bans, taxes, and fines; and 2) use of environmental stewardship payments to reward environmental performance.

Source: USDA-ERS Ag Outlook Summary, Oct. 20, 1993.

FAO EXAMINES EDUCATION PROGRAMS ON ENVIRONMENTAL SUSTAINABILITY

In early December UNL Extension Communications Specialist Jim King worked with people from 18 countries during an FAO conference in Rome, "Integration of Environmental and Sustainable Development Themes into Agricultural Educational and Extension Programmes." FAO objectives were: (1) to examine the nature and scope of involvement of ag education and extension institutions in environmental and sustainable development; (2) to identify roles, strategies and appropriate approaches through which ag education and extension institutions could contribute to the

implementation of Agenda 21 of UNCED; and (3) to identify and discuss issues and suggest policy and lines of action to improve the role and contribution of ag education, training and extension institution in environmental management and sustainable ag and rural development. The strengths of U.S. programs were evident: growing faculty commitment, joint appointments, regional extension and research centers, Extension's targeted issues-based programming, good linkages to the public and broad citizen involvement in program development, a growing land-grant commitment to sustainability, curriculum renewal efforts, and emphasis on natural resources. For more information contact Jim King, 104 ACB, University of Nebraska, Lincoln, NE 68583-0918, 402-472-3022, email agcm009@unlvm.unl.edu. (Submitted by Jim King)

RESEARCH ON REDUCING ENVIRONMENTAL IMPACTS OF LIVESTOCK

The USEPA is sponsoring a multidisciplinary research project called "Livestock and the Environment: A National Pilot Project." The project's overall objective is to identify technologies, management methods, public policies, and institutions that can reduce the negative impacts of concentrated livestock production on the environment, and at the same time, result in a livestock industry that is economically viable and competitive. The Center for Agricultural and Rural Development is a lead entity on the project and is beginning to issue a series of reports containing results. Contact CARD, Iowa State U., 578 Heady Hall, Ames, IA 50011-1070.

IN THE SEMINAR SPOTLIGHT

Clive Edwards, entomology professor and director of the Sustainable Agriculture Program at Ohio State U., Jan. 20, University of Nebraska-Lincoln, "Importance of Systems Integration to Sustainable Agriculture."

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While there are many experts in various components of sustainable agriculture, few have pieced together a complete picture of integrated sustainable systems in which all the components complement each other. A simplified example is using crop residue as food for livestock and the residue from that livestock as fertilizer for the crop. While there's a great deal more to it than that, the concept that all things work together is what agriculture must work toward in the current "biological age," which follows 40 years of the "chemical age." Only 25% of the inorganic nitrogen put on a crop comes off with the crop; of the remainder, up to 47% is lost to erosion (the U.S. has already lost 1/3 of its topsoil), 15-20% to volatization, and 10-50% is leached into the groundwater. An estimated 1,500 pesticides exist today, 90% of which is used by corn, soybeans and cotton (of that, corn uses half). Besides getting "lost" in the environment, the law of diminishing returns eventually takes effect; there comes a point when adding more fertilizer does not mean a larger crop. Between 1945 and 1988, the use of nitrogen fertilizer increased 20-fold, yet crop yields increased just three-fold. And insects and weeds gradually build up resistances to synthetic controls. Synthetic pesticides also are non-

selective, killing off the beneficial pests as well as the harmful pests, leaving the plant with no natural pest controllers and thus it becomes dependent upon the synthetic pesticides. That is compounded by the amount of U.S. farming today that is continuous cropping and monoculture. Sustainable agriculture integration doesn't call for doing away with all synthetic pesticides; it does call for proper pesticide timing and placement, cultural controls, saving organic matter, and genetic engineering. (Notes by Cheryl Alberts)

Editor's Note: Clive has authored several related papers. For copies of the following contact Clive Edwards, Entomology Dept., Ohio State U., Columbus, OH 43210: The Environmental Impact of Pesticides, 1987; The Use of Key Indicator Processes for Assessment of the Effects of Pesticides on Soil Ecosystems, 1988; Designing Integrated Low-Input Farming Systems to Achieve Effective Weed Control, 1989; The Use of Innovative Agricultural Practices in a Farm Systems Context for Pest Control in the 1990s, 1990; Long-Term Ecological Effects of Herbicides: Field Studies, 1991. Clive also authored "The concept of integrated systems in lower input/sustainable agriculture," Amer. J. Alt. Ag., Volume II, No. 4.

UPCOMING EVENTS

Satellite Seminar Series on Manure: The IANR Manure Utilization Committee (Don Sander, chair) has organized a satellite seminar series on manure. On Feb. 21 Dennis Schulte will speak on "Manure Issues in Europe." The March 25 seminar will highlight the environmental viewpoint, followed by a review on past manure research in April. Contact: Don Sander, Agronomy Dept., 402-472-1501.

NSAS Annual Meeting: Feb. 26, Columbus, NE. Featured speakers at the Nebraska Sustainable Agriculture Society annual meeting will be Dr. John Ikerd from the U. of Missouri on quality of life issues in sustainable ag, and Robyn Van En, co-founder of the first community supported agriculture (CSA) farm in the U.S. Ms. Van En will also make a presentation on CSAs at the Douglas County Extension Office in Omaha the evening of Feb. 25, an event co-sponsored by the CSAS. Contact: Tim Powell, UNL Northeast Research and Extension Center, 402-584-2261.

Beginning Farmer Conference: Mar. 4-5, Omaha, NE. "Farmers for the Next Century," the first national conference for beginning farmers and ranchers, will have workshops on: government programs; financial planning; start-up strategies; estate planning strategies; financing from commercial lenders; low-cost hog, cattle and sheep production strategies; using leases, buy/sell agreements. Contact: Nancy Thompson, Center for Rural Affairs, 402-846-5428.

Linking Communities to Agriculture: Mar. 5, Columbus, NE. Speakers at this public forum will introduce issues and provide a framework for discussing the impact of ag production and policy changes on communities. They also will discuss potential alliances between groups focusing on maintaining the quality of

life in rural Nebraska. Panel members include farmers, agribusiness operators and entrepreneurs. Trade show allows entrepreneurs to exhibit their products and exchange ideas with community leaders on new economic development opportunities; tables are $5 each and must be reserved by Feb. 25. The meeting is part of the Strengthen Economic Links Locally (SELL) program in the UNL Ag. Econ. Dept. Contact: Karen Loftis, l-800-328-2851.

1994 Nebraska Water Conference: Mar. 14-16, Lincoln, NE. "Conjunctive Use: Sharing a Resource," focus on state water policy. Contact: UNL Water Center/Environmental Programs, 402-472-3305.

Applied Research and Education in Sustainable Agriculture: What Have We Learned? Apr. 11-12, Indianapolis, IN. Workshop for scientists and educators who work with sustainable ag practices and practitioners. Program topics: 1) Farming Systems and Sustainable Ag -- What Have We Learned? Building Interdisciplinary Teams; 2) Farmer Decision Aids (chaired by Jerry White, Cornell) -- Preparing and Evaluating Decision Aids, Examples of Sustainable Ag Decision Aids; 3) Applied Research and Demonstration Projects (chaired by Glenn Helmers, Nebraska) -- Setting Up a Farming System Project, Interpretation and Use of Results, Reports of Successful Projects; 4) Methods For Applied Research and Education (chaired by Steve Lovejoy, Purdue) -- Alternative Techniques, Case Studies-Modeling-Centers, Farmer Participation. This event is sponsored by the North Central Farm Management Extension Committee and the Farm Foundation. Contact: William Edwards at Iowa State U., 515-294-6161.

Second National IPM Symposium/Workshop: Apr. 12-22, Las Vegas, NV. Opportunity for scientists from all disciplines to exchange most recent information and plan for IPM's future critical role in sustainable ag, food safety, and environmental stewardship. Contact: Ronald Kuhr, North Carolina State U., Dept. of Entomology, Box 7613, Raleigh, NC 27695-7613.

Second Environmentally Sound Ag Conference: Apr. 20-22, Orlando, FL. Focus on state-of-the-art technology for sustaining an environmentally sound and productive ag industry in an urbanizing U.S. Major topic areas: surface and ground water management; point sources of contamination; air pollution; wildlife and habitat preservation; urban/agricultural interrelationship. Contact: Pat Neilson, U. of Florida, Office of Conferences, PO Box 110750, Gainesville, Fl 32611-0750, 904-392-5930.

5th International Symposium On Earthworm Ecology: July 5-9, Columbus, OH. Nine consecutive plenary sessions: earthworm (EW) taxonomy, diversity & biogeography; EW ecology, biology, behavior; EW, organic matter, nutrient dynamics, microbial ecology; influence of EW on soil physical structure & function; interactions between EW, other soil invertebrates, and plants; EW in environ. & waste mgt.; EW & environ. contamination; EW as bioindicators of sustainability & productivity; EW in ag & other managed ecosystems. Contact: Dr. Clive Edwards, Entomology Dept., Ohio State U., Columbus, OH 43210, 614-292-3786.

Agroforestry and Sustainable Systems Symposium: Aug. 7-10, Fort Collins, CO. Designed for researchers, practitioners, technical specialists and educators. Speakers will focus on how trees, integrated into sustainable ag land-use systems in the semiarid west, will enhance ag productivity, natural resource conservation, and natural and human environments. Proposals for poster papers due April 15. Contact: Kim Isaacson, USDA Forest Service, Center for Semiarid Agroforestry, FSL, U. of Nebraska, Lincoln, NE 68583-0822, 402-472-5178.

International Conference on Modern Ag. and the Environment: Oct. 2-6, Rehovot, Israel. Topics include: controlled application and mgt. of fertilizers, pests, pesticides, and alternatives; reclamation and utilization of wastewater; recycling of municipal and ag waste; pollution and detoxification of heavy metals. Deadline for abstract submissions is Apr. 30. Contact: Conference Secretariat, "Agriculture and Environment Conference," Peltours-Te'um Congress Organisers, PO Box 8388, Jerusalem 91082, Israel.

ELECTRONIC COMMUNICATION IS IN

With less money and time to travel and more access to worldwide computer networks, more people are turning to e-mail, file servers, electronic meeting groups, and managed electronic conferences in which registered participants read and post to an electronic bulletin board. Of potential interest to our readers are the following global activities:
- SANET - electronic meeting group focusing on sustaining agriculture and communities; created in 1991.
- "Indicators of Sustainability" -- conference dealing with development of physical, biological, social and economic indicators of sustainability; runs until Jan. 17 - April 15, 1994, with documents available longer.
- "IPMnet" - bulletin board containing a newsletter, information exchange forum, technical reports and databases; created in late 1993.
- "Ecotechnology for Sustainable Development" -- conference for those unable to attend the national conference, regional workshops, or local seminars associated with this multi-faceted effort.

Any of the above may be "joined" at any time. For more information contact the CSAS office.

RESOURCES

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"Our Sustainable Future" is a book series that provides an interdisciplinary forum for discussion of issues on development of sustainable communities, food production, and resource use systems at both the local and the global level. Many of today's challenges are found at the interfaces between disciplines and require systemic, multidisciplinary approaches. In this new book series from University of Nebraska Press, we focus our collective sense of urgency in seeking creative solutions for sustainable development. Collecting and summarizing information for a student audience and for the general public serves the broad educational agenda of universities by providing information and

insights on new alternatives for the future. Hot off the press is the latest in the series, "Future Harvest: Pesticide Free Farming," by Jim Bender, 1994, $21 (+ s&h). From his own experience farming 600 acres near Weeping Water, Neb., Jim addresses the crucial issues involved in developing a commercially-sized, conservation-oriented organic farm that is economically viable. A sidenote is that Jim is on our CSAS Advisory Committee.

The following is a list of other books in this series (add $2.50 s&h for first book and 25 cents for each additional book):
"Agricultural Research Alternatives," by William Lockeretz and Mollie Anderson, 1993, $30.
"Building Soils for Better Crops: Organic Matter Management," by Fred Magdoff, 1993, $22.95.
"Crop Improvement for Sustainable Agriculture," by Brett Callaway and Charles Francis, 1993, $35.
"Ogallala: Water for a Dry Land," by John Opie, 1993, $35.
"A Conspiracy of Optimism: Sustained Yield, Multiple Use, and Intensive management of the National Forests, 1945-91," by Paul Hirt, 1994, $40 (tentative).
Related Books:
"New Roots for Agriculture," by Wes Jackson, 1985, $7.95.
"Family Farming: A New Economic Vision," by Marty Strange, 1988, $9.95.
"Struggle for the Land: Indigenous Insight and Industrial Empire on the Semiarid World," edited by Paul Olson, 1990, $37.95.

Inquiries are invited from potential authors about projects on the general theme of sustainable agriculture and development. The Acquisitions Editor at Nebraska Press is Nancy Rosen, and one of the Series Editors is Charles Francis. Order information is available from University of Nebraska Press, P.O. Box 880520, Lincoln, NE 68588-0520, 402-472-3584.

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"Farm Policies and the Sustainability of Agriculture: Rethinking the Connections," and "Enhancing Agricultural Sustainability Through Changes In Federal Commodity Policy: Marginal Versus Radical Change," $6 ea. Wallace Institute for Alternative Agriculture, 9200 Edmonston Rd, #117, Greenbelt, MD 20770, 301-441-8777.

"American Journal of Alternative Agriculture," Latest issue features Ag Policy Debates: Examining Alternative and Conventional Perspectives, Barriers to Low-Input Ag Adoption: A Case Study, Is Sustainable Ag and Elixir for Rural Communities? Annual subscriptions begin at $44. Wallace Institute (see above).

"1993 State of Rural Nebraska Report," and "Top 100 Development Projects in Rural Nebraska," $5 ea. Nebraska Rural Development Commission, 402-471-2698.

"Biological Control of Insects and Mites," NCR Pub. 481, $11. U. of Nebraska, Lincoln, NE 68583-0918.

"Who Owns America's Farmland?" free. Customer Services Div., U.S.

Dept. of Commerce, Bureau of Census, Washington, DC 20233-0001.

"The Real Dirt" is based on interviews with 60 farmers in eight states, and offers first-hand knowledge on biological, cultural, mechanical and chemical tools for modern organic and low-input farmers, $13.95. Sustainable Agriculture Publications, Hills Bldg., U. of Vermont, Burlington, VT 05405-0082, 802-656-0471.

"Agronomic, Economic, and Ecological Relationships in Alternative (Organic), Conventional, and Reduced-till Farming Systems," free. Ag Bulletin Room, Lincoln Music Hall, Rm 112, South Dakota State U., Brookings, SD 57007, 605-688-5628.

"Farming and Clean Water," 116-page community action guide, $15. The Minnesota Project, 1885 University Ave. W, #315, St. Paul, MN, 612-645-6159.

"Agricultural Nonpoint Source Pollution: Toward a Consensus Approach to Its Abatement." American Farmland Trust, 1920 N St., NW, #400, Washington, DC 20036, 202-659-5170.

"Soil and Water Quality: An Agenda for Agriculture," report by National Research Council. Call Carla Carlson, Board on Agriculture, 202-334-2252.

Information on earthworms--curriculum materials, video, facts brochure, list of journal articles. Contact Leopold Center, 126 Soil Tilth Bldg, Iowa State U., Ames, IA 50011-3120, 515-294-3711. (See Leopold Center's Winter 1993 newsletter for earthworm article).

"Agrarian Advocate," bi-monthly focuses on local self-reliance, sustainable ag, organic farming and CSAs. Community Alliance with Family Farmers, PO Box 464, Davis, CA 95617.

"The Socioeconomics of Sustainable Agriculture: An Annotated Bibliography," Gary Boreham et al. 1992, Garland Publishing, Inc., New York. Has about 50 entries on cropping, so it's broader than title suggests.

"Food for the Future," edited by Patricia Allen with 14 contributing authors. 1993. John Wiley & Sons.

Home

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