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From the Director

The Problems of Science

Pesticides in water, animal waste problems, automobile pollution, and the lack of urban recycling are examples of the "loop" not being closed in our human systems. These problems are often laid at the doorstep of the scientific community. As scientific technology has become more complex, however, technology may only solve part of the problem, and in some cases may create problems. There are limits to what technology and science can do.

How can science improve the way it deals with contemporary issues? The answer to part of the question, I believe, lies in understanding how science is organized. Much of what we believe and how we operate is a result of thinking that was advanced by Bacon, Descartes, and Newton during the 1500s to 1700s. They believed scientists should seek knowledge to dominate and control nature. They also believed all problems could be broken into pieces. Reductionism in science was the belief that all aspects of complex phenomena could be understood by reducing them to their constituent parts. The material universe was considered to behave like a machine. Natural and human-made systems are not machines, yet much of our science starts with this premise. As long as we continue to study pieces of a particular problem, and not examine the whole system, we will come up short.

Those of us in academic institutions and other agencies attempting to deal with current problems need to understand that the "small box of reductionism" will continue to cause credibility problems for the scientific community and any "answers" it finds. If as much effort were invested in creative systems approach research as is expended for reductionist research, the result could be more useable information for those of us attempting to manage the vast and complex problems we face. The agricultural systems conference presented at UC Davis last November (see article this page), which focused on relationships between production practices and social and environmental issues, was a positive step toward broadening the way we look at the world's food production system. *Bill Liebhardt, director, UC Sustainable Agriculture Research & Education Program.*

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Agricultural Systems: Incorporate Social, Environmental Concerns

by Gail Feenstra, SAREP

Natural and social scientists and farmers came together to share various approaches to agricultural systems research at a conference and workshops sponsored by the UC Sustainable Agriculture Research and Education Program (SAREP), November 18-20, 1991. **Bill Liebhardt, SAREP director,** set the stage for the conference with opening remarks that broadened the agricultural system to include both environmental and social goals. The systems approach, said Liebhardt, "is based on a theoretical construct which suggests *relationships.* We are beginning to see relationships among production practices, environmental degradation, food safety, health and safety of agricultural workers, the structure of agriculture, and the viability of rural communities. Researchers in universities find that the approaches of 'reductionist science' are insufficient to discuss the complex and dynamic issues involved in the world's food production system. A new, expanded way of seeing the world and our activities in it is in order." Liebhardt said agricultural and social science researchers, farmers, Extension personnel, consumers, farmworkers and others in the food system all need to become involved in discussing the problems and suggesting potential solutions.

Dialogue among researchers of many disciplines and farmers was a key part of the conference. A major focus was the complexity of the farm environment, which is part biophysical, part socioeconomic. Speakers in the morning focused on farming systems research and extension and other methods used in agricultural systems research. Afternoon speakers discussed the environmental and social costs of agricultural practices and current farm structure. Panels in both the morning and afternoon provided an opportunity for farmers, researchers, policy analysts and extension personnel to exchange views and interact with conference participants. The panel discussions demonstrated how agricultural research can be enriched by the expertise and involvement of farmers and social scientists. Two days of workshops following the conference gave participants the opportunity to apply actual data to farming systems analysis or talk about environmental cost accounting in greater depth. The following discussion outlines major issues discussed on the first day of the conference.

Farming Systems Research Methodologies

The morning session of the conference focused on farming systems research, and featured one of the foremost practitioners and teachers of systems analysis for on-farm agricultural research, **Peter Hildebrand,** of the Institute of Food and Agricultural Sciences at the University of Florida. Hildebrand

discussed the history and development of farming systems research and extension (FSRE) activity worldwide, linking it to sustainable agriculture. He outlined the different components of FSRE, a farmer participatory systems methodology for sustainable agriculture. He discussed diagnosing and selecting the problems, depicting alternative solutions, designing on-farm evaluation procedures (on-farm trials), evaluating results, disseminating acceptable solutions, making recommendations and planning the next round of activities based on the results of the current round.

Following Hildebrand's presentation, three researchers discussed applications of the systems approach within the context of their own field research projects. **Steve Temple**, of the UC Davis agronomy and range science department, described the methodology used to compare conventional, low-input, and organic cropping systems for the Sacramento Valley. This multidisciplinary project uses a classical replication model to make comparisons among different treatments. (See "Farming Systems Comparison Field Day," *Sustainable Agriculture News, Vol. 2, No.1, Fall 1989.)* According to Temple, changes in the cropping systems are evaluated through intensive pest monitoring, soil sampling, crop growth and yield measurements and cost/income analyses. Models that emphasize shared leadership and attention to the soil, rotations and the long-term perspective are all important, Temple said.

Laurie Drinkwater, of the UC Davis vegetable crops department, described a multidisciplinary on-farm project comparing organic, transitional and conventional tomato production systems. Multivariate statistics were used to analyze the soil, disease, insect and management characteristics of 20 commercial farms over a three-year period. Intensive sampling allowed researchers to determine how various ecological processes respond to different amounts and types of inputs (e.g. organic vs. inorganic fertilizers). Principal components analysis was used to determine if broad management effects on soil properties could be distinguished from the unavoidable variability of parent soil type on the different farms. According to Drinkwater, management effects clearly overwhelmed differences due to soil formation factors. The soil characteristics most affected by management were inorganic nitrogen pools, microbial activity, pH, electrical conductivity and, to some extent, organic carbon. Coordinating data collection for different disciplines has allowed researchers to examine the interaction of various biological and management factors, for example, the effect of the soil environment on severity of soil-borne disease. Multivariate analysis provides the opportunity to discriminate between site-specific and management-related differences, said Drinkwater.

Helene Murray, director of the Oregon and Washington State Universities/USDA Sustainable Agriculture Research and Education (formerly LISA) program project, discussed the use of the *sondeo,* a flexible on-farm interview technique used by an interdisciplinary team. A sondeo is one rapid reconnaissance tool that grew out of farming systems research in Latin America and is intended to provide a quick, preliminary sketch of farming systems. It does not use quantitative data as do more conventional research methods. Murray's research team surveyed innovative organic and conventional farmers in western Oregon and Washington. The goals of the sondeo were to: 1) identify the factors influencing farm management among innovative growers; 2) examine how innovative growers with farms of

different sizes and production methods are responding to these challenges; 3) examine the usefulness of the sondeo as a research and extension tool; and 4) identify collaborating growers for longer-term project participation. The sondeo team consisted of researchers and extension personnel in horticulture, agronomy, anthropology, plant pathology, plant ecology, weed science, entomology, soil science, agricultural marketing and economics. The sondeo provided the team with the opportunity to work together and develop a common understanding of research and extension priorities, she said. Interviews were conducted with 25 farmers in a relaxed, focus-group design. The informal approach provided a good learning and team-building environment for the sondeo team. Results of the sondeo show that the major off-farm influences on the producers in the sondeo group relate to labor availability and public concern over the use of pesticides. Many of the growers, whether organic or conventional, are responding to environmental and social pressures and crop management problems with innovative management, Murray said. In fact, the sondeo revealed that the innovative growers in this study have much in common and much to offer researchers and other growers.

Working Relationships

Yolo County farmers **Tony Turkovich** and **Raul Adamchak** participated in a panel with the morning speakers, where they discussed working relationships in agricultural systems research. Turkovich stressed the importance of regular and frequent meetings between farmers and researchers so that practical problems can be dealt with in a timely manner. Adamchak suggested that even more farmer-directed research is needed in order to address the problems that farmers really face. Farmer participation in research has been sparse so far. Helene Murray reiterated that farmers have been key members of sondeo teams. Methods to facilitate good working relationships in the teams have included extensive use of conference calls, and becoming aware of different learning styles among team members. Overall, participants and speakers agreed that more farmer input in the design and implementation of on-farm research should be encouraged.

Environmental & Social Accounting

The afternoon session switched gears from farming systems research to broader analyses of environmental and social costs of current farming practices and structures. **Paul Faeth,** a senior associate in the Washington, D.C. World Resources Institute's (WRI) economics and technology research program, began the discussion with a presentation of WRI's study, *Paying the Farm Bill: Agricultural Policy and the Transition to Sustainable Agriculture,* an examination of U.S. agricultural policy that explicitly includes economic measures of sustainability. According to Faeth, farmers do not include an accounting of sustainable resource use-such as soil and water-in calculating net income. Yet, by ignoring these costs, farmers who do not use resource-conserving farming practices pay the price through lost productivity. Environmental costs will eventually be borne by society. Unfortunately, government agricultural policies and support programs make things worse by discouraging farmers from adopting resource-conserving strategies. Since environmental costs are ignored, farmers' income is overstated in the present, leading to distorted choices among available farming practices. Faeth

described how the WRI study used quantitative methods of resource accounting for soil erosion to compare different farming systems. WRI researchers asked the question, *Which system would farmers and society pick, given five different policy options?*

The data for the report came from long-term field trials in Pennsylvania and Nebraska. Soil erosion rates and long-term productivity losses were analyzed for each site and technology using the USDA Erosion Productivity Impact Calculator (EPIC) Model. The soil erosion estimates take into account recreational losses, harbor dredging, municipal water treatment, steam power cooling, flooding, navigation, roadside ditch clearing, and irrigation. Output from this model was then used with USDA estimates of regional damages caused by soil erosion to estimate the off-farm costs associated with conventional and alternative crop rotations. Results show that where erosion-prone soils are causing environmental damage on and off the farm, resource-conserving production systems are economically superior. Farmers who adopt these resource-conserving systems may suffer some short-term income loss during the transition phase, but are likely to make long-term financial gains by improving their land's productivity. (See Faeth et al., *Components, No.2, Vol.3, Summer 1991.)*

Farm Scale

Dean MacCannell and **Isao Fujimoto,** researchers in the Applied Behavioral Science Department at UC Davis, focused on the social impacts of agriculture as they relate to the structure of agriculture (scale, technology choices and control of resources), community development and sustainability. MacCannell reported on the comparative community studies he and Fujimoto have worked on that tested a hypothesis put forth in 1944 by **Walter Goldschmidt,** a University of California, Los Angeles anthropologist. In an ethnographic comparison of Arvin and Dinuba, two towns in the Central Valley, Goldschmidt attributed differences in the quality of life to the structure of the surrounding agriculture. He concluded that smaller-scale family-owned and operated farms are crucial to the health and well-being of rural communities. MacCannell's work through the UC Davis Macrosocial Accounting Project was to improve Goldschmidt's research design by doing macro-comparisons of 80 California Central Valley communities or 100 sunbelt counties. This research found that Goldschmidt's hypothesis withstood more rigorous testing. According to MacCannell, the relationship can be described by an "inverted J" curve, with quality of life in rural communities on the vertical axis and farm size on the horizontal axis. Quality of life improves as farm size increases until about 300 acres. Then, said MacCannell, quality of life decreases significantly as farm size increases further. In a similar vein, Fujimoto's study looked at the structure and location of communities in relation to the control of water. His recent work examined the role of coalition building in bringing about sustainable development in agriculture and communities in the Central Valley.

Ag Coalition

Larry Yee, Ventura County UC Cooperative Extension director**,** followed Fujimoto's discussion with a real-life example of coalition building in Ventura County, the Ventura County Food Safety Study Group. Galvanized

by the "Alar scare" in 1989, Larry Yee and **Tim Wallace**, an Extension economist in agriculture and resource economics at UC Berkeley, formed a coalition of diverse individuals including environmentalists, agricultural leaders, the League of Women Voters, food retailers, farm labor and consumer advocates and chemical testing labs. The coalition was created to explore ways to improve the credibility of the food system in Ventura County, and in the long run, to reduce the use of pesticides. Yee said it was a practical, grassroots attempt to involve people in the community in discussion and decision-making about their food system. The process was an open, flexible one in which the group set the agenda and "owned the process," he noted. Through constant input and feedback from all members of the group, mutual education was fostered, issues were clarified, and communication and problem solving improved, Yee said. Most significantly, trust has been built among representatives of diverse and sometimes antagonistic interests. Currently, the Food Safety Study Group is exploring ways to expand the process to the larger community.

Social Science & Farming

A second panel, including all of the afternoon speakers, and **Mas Masumoto**, a Del Rey farmer with California Clean Growers, reflected on how the work of social scientists might complement or enrich farming systems research. Faeth commented on the need to improve our economic analysis of the "factors of production," considering natural resources as assets in an explicit way in figuring net farm income. Farming systems research should include a more complete notion of economic accountability. He also noted that if WRI's analysis is taken seriously by policymakers, it should strengthen the case for devoting more federal research monies to sustainable agriculture.

MacCannell suggested that whole farm case studies could benefit from the expertise of anthropologists or ethnographers. He also noted that a neglected and potentially fruitful area of research would consider how "economies of scale," studied from an economic perspective, mesh with what is known about social costs of large-scale agriculture. Fujimoto went even further to suggest the need to expand ways of measuring the impacts of agricultural practices on rural communities. He noted that commonly used quantitative economic models describe impacts in dollars and cents. Fujimoto suggested the need to develop more creative ways to measure the qualitative impacts of agriculture on communities. Masumoto concluded there is a need to recapture local knowledge about farming systems, from farmers and from communities. He said it is important to emphasize that farmers, consumers, researchers, farmworkers and policymakers are a community, and thus have a need to speak the language of interdisciplinary work.

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Sustainable Ag Summer Course

Reservations are now being accepted for an eight-week summer course "Introduction to Sustainable Agricultural Systems," offered through the UC Davis Student Experimental Farm (Agronomy 192). The eight-unit course is scheduled five days per week from June 22 to August 14, 1992. The intensive class includes lectures, labs, discussion, field trips and 12 hours per week of practical, infield education. Topics include ecological management of soil, water, crops, plant diseases, insects, genetic preservation, small farm equipment use, integrating plant and animal systems, and socio-economic aspects of sustainability. The course is open to University of California students and non-students with the instructor's consent. Enrollment in the course is limited and space should be reserved by May 15, 1992. Contact **Mark Van Horn,** Student Experimental Farm, Department of Agronomy, University of California, Davis, CA 95616. Telephone: (916) 752-7645.

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SAREP in Spanish

SAREP has begun a new project to coordinate the collection and evaluation of Spanish language information on sustainable agriculture production practices and marketing for entry level farmers. **Beatriz Cabezon,** a graduate student from Argentina with experience in agronomy and Spanish translation, is contacting farm advisors, university programs, and non-profit organizations throughout the state to gather existing Spanish language sustainable agriculture information. These materials will be evaluated by a review committee for usefulness, content and readability and catalogued (with abstracts in English and Spanish) in a database. They will be publicized and made available in several California locations. Information gaps identified by the review committee and SAREP staff will be filled with additional material translated into Spanish.

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Citrus Herbicides & Groundwater Quality

By Chuck Ingles, SAREP

(Editor's Note: This is the second part of a two-part series on citrus production and groundwater contamination. Part 1 appeared in Sustainable Agriculture News, Vol.4, No.2, Winter 1992. Information from this series will be included in a SAREP citrus publication due out at the end of 1992.)

For citrus growers, prevention of nitrate leaching can be a far more difficult task than that of herbicide leaching: farmers cannot simply stop applying nitrogen (N). The problem is a concern to both conventional and organic growers, since nitrate can leach below the root zone from organic and synthetic fertilizers. Several management practices exist to reduce the potential for nitrate leaching.

Determine N supply and demand. Citrus trees typically require about 100 to 150 pounds of N/acre/year, however lemons can require up to double this amount. Annual leaf analyses can indicate the need for less N; fertilizing on the basis of leaf analysis can result in less nitrate leaching while maintaining fruit quality and yield. Equally important, and often overlooked, is the need to sample irrigation water to determine nitrate content, and to reduce N fertilizer use accordingly.

Time of application. The time of maximum N uptake is during the summer. Because flowering and fruit set require high levels of N in the tree, however, N must be made available to the trees shortly before flowering. Fertilizer is usually applied in late winter and early spring, with split soil applications frequently made in February, March, and April. Some growers, however, apply N fertilizer in the fall. This practice stems from the tradition of applying raw manure in the fall so that winter rains can move nitrate into the root zone. A substantial portion of fall-applied N will leach beyond the root zone as a result of winter rainfall, water applied during frosts to warm the orchard, and reduced root N uptake during the winter.

Choice of materials. The choice of N fertilizer can affect the accumulation and leaching of nitrate. Synthetic nitrogen fertilizers supply N in the form of nitrate, ammonium, and/or urea (which is rapidly converted to ammonium in the soil). Some ammonium is taken up by the plants directly and some is adsorbed onto soil particles, thus delaying N loss through leaching. However, most of the ammonium is converted to nitrate within a relatively short period of time. How much nitrate leaches below the root zone depends on the rate and frequency of application as well as the depth to which irrigation water percolates.

Bulky organic materials such as manure and compost release N more slowly as the organic matter decomposes. However, excessive applications of manure can also result in leaching losses. Finished compost supplies a more

stable and slow-release form of N than conventional fertilizers or manure. Compost applications can therefore be made at any time of the year without significant loss to leaching. Compost also provides the soil with humus, a stable form of organic matter, which is invaluable in nutrient cycling. Because of low N content and expense, most growers who use compost also use supplements of chemical fertilizers and/or cover crops. Slow-release synthetic fertilizers are also available; these can reduce the nitrate pollution potential. A significant problem with slow-release fertilizers, including organic materials, is that a continuous N supply can cause fruit quality problems such as regreening. A moderate application of compost, together with spring applications of soluble materials, may strike a balance between maintaining fruit quality and yields, reducing nitrate leaching, and improving soil quality.

Cover crops can be useful in converting mobile soil nitrate into immobile plant organic N. Winter annual cover crops can utilize rainfall for growth and remove excess soil nitrate during winter, when nitrate leaching potential is the greatest. (For more information on cover cropping in citrus, see UC SAREP's *Components, Vol.2, No.3, Summer 199].)*

Foliar applications of urea result in vastly reduced nitrate pollution potential compared to soil-applied N, and yield and fruit quality can be maintained or enhanced. A practical fertilization strategy might be to supply half the N to the foliage (two to four sprays) and half through soil applications. Foliar sprays may be applied in the winter and early spring, but researchers at UC Riverside have recently shown that January and February applications may lead to the highest yields. Organic materials such as fish emulsion may be useful as foliar sprays, although they contain less N and are far more expensive than urea. The practice of applying N to the foliage is not universally accepted. Some growers believe that the nutrient pathway is and should be through the roots**.**

"Fertigation." The application of water-soluble fertilizers through the irrigation system is called "fertigation." If the depth of wetting can be limited as well, fertigation can provide a "steady state" of N availability only when N is needed by the tree, with greatly reduced potential for nitrate leaching. Fertigation can be used in small amounts up to 15 times through the spring. (Often only three to five applications are made.)

Growers of all crops are being challenged to produce safe, inexpensive food without damaging the soil, the air, or the water. They must also maintain their economic stability. In the long term, however, economic stability is dependent on environmental and social well-being. Citrus growers are confronted with numerous obstacles to sustainability. Yet many practices have been developed to reduce the environmental impacts. Should we wait until regulations force us to be nonpolluting?

Thanks go to John Freeman, Jim Gorden, Ralph Jurgens, Rob McGill, Neil O'Connell, John Pehrson and others for information used in these articles.

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New Publication

A guide to organic soil amendments and fertilizers will be available in mid-1992 through UCANR Publications. *Organic Soil Amendments and Fertilizers* was written by co-authors **David Chaney,** UC SAREP, **Laurie Drinkwater,** UC Davis Vegetable Crops and **Stuart Pettygrove**, UC Davis Land, Air and Water Resources. The publication contains the latest information on choosing and using organic materials. The publication has been two years in the making and doubles as both a handbook and reference guide. It includes a practical summary of the benefits and value of organic matter, guidelines for evaluating organic materials, and descriptions of more than 25 organic fertilizers and amendments available in California, including:

- sawdust and bark
- fish emulsion and meal
- cannery waste
- kelp
- compost
- animal manures
- crop residues
- green manures
- sewage sludge

The publication will be of interest to farmers, agricultural advisers, waste management specialists, and home gardeners. To order a copy of *Organic Soil Amendments and Fertilizers* contact ANR Publications, University of California, 6701 San Pablo Ave., Oakland, CA 94608-1239, (510) 642-2431, or Agricultural Information & Publications, University of California, Davis, CA 95616, (916) 757-8930.

Resources

Videos

Sustainable Agriculture. Explains the basics of sustainable agriculture, including efficient use of natural resources, and ecologically sound, profitable, socially responsible and humane agricultural practices. Includes on-site California farm visits, interviews with farmers who have successfully made the transition to sustainable production practices, and interviews with agricultural experts including UC SAREP's covercrops analyst **Robert Bugg**. Aimed at farm advisors, Extension personnel, university researchers and instructors, high school and 4-H audiences. Running time: 30 minutes. Price: $89, plus $4 shipping & handling. Contact: San Luis Video Publishing, P.O. Box 4604, San Luis Obispo, CA 93403 or call (805) 545-5426.

Farmer-to-Farmer: Strategies for Sustainable Agriculture. A video series featuring Field Crops, Rotational Grazing, Vegetables, IPM for Vegetables and Small Fruits, IPM for Apples, and High-Value Marketing. Each video addresses not only the sustainability of the land, but also the economic sustainability of the farm family. Photographed over an entire growing season in the northern and mid-Atlantic regions of the U.S., with input from 200 farmers and other experts. Funded in part by the USDA Sustainable Agriculture Research and Education (formerly LISA) program, the Rodale Institute and Rooy Media. Each 30-minute video is $29.95. A complete set of all six video tapes is $149.95. Contact: Farm Videos, c/o Rooy Media, 7407 Hilltop Dr., Frederick, MD 21702, (301) 473-8797.

Three from Griesinger Films (available together for $65, or individually priced. Griesinger Films, 7300 Old Mill Rd., Gates Mills, OH 44040, (216) 423-1601):

-*An Introduction to Ecological Economics.* With **Gaylord Nelson**, **Herman Daly** and **John Cobb, Jr.** A 45-minute 1991 video of a conference sponsored by The Madison Institute and the Madison Campus Ministry, Madison, WI. Discussion of new macro-economic principles that redefine traditional concepts of land, and the consequences of national accounting methods, uncontrolled development and natural resource depletion. $19.95.

-*Robert Parnes Speaks on the Science & Necessity of Organic Residues in the Soil.* Discussion of plant nutrients and organic matter by the author of *Fertile Soil.* Emphasis on the significance of minimizing soil disturbance, green manures, catch crops and permanent cover crops. From a meeting of the West Virginia Extension Service's Center for Sustainable and Alternative Agriculture, and the Mountain State Growers and Buyers Association. $29.95.

-*Changing U.S. Farm Policy* Winner of a Special Merit award at the 1991

Earth Peace International Film Festival in Burlington, VT. A 17-minute video of the first (1989) National Conference on Organic/Sustainable Agriculture sponsored by the Center for Science in the Public Interest. Barry Commoner and Jim Hightower are featured with others speaking on key national food policy issues. $25.

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Sources of Funding

SAREP Economic, Public Policy Grants

UC SAREP is offering a Request for Proposals in 1992 devoted to social, economic and public policy analysis of food and agricultural systems. Successful proposals will explicitly relate to the goals of sustainable agriculture and address one or more of the following areas: public policy, labor policies and practices, land use, rural community development, decision-making and the transition to sustainable agriculture, and consumers and the food system. To receive a copy of the RFP write to UC SAREP University of California, Davis, CA 95616 or call (916)752-7556. *It is important to note that this RFP will require the submission of a pre-proposal*. Individuals interested in submitting a pre-proposal are strongly encouraged to attend a planning meeting with SAREP staff and public and technical advisory committee members on Thursday, April 9, from 12:30-3 p.m. To be included in the pre-proposal meeting contact Gail Feenstra (916/752-8408) or David Campbell (916/752-7556*).* Twenty copies of the pre-proposal must be received in the SAREP office by 5 p.m. May 13, 1992. FAX preproposals will not be accepted. Project investigators will be notified by July 1, 1992 if they will be invited to submit full proposals. Full proposals must be submitted by September 1,1992. Awards will be announced by November 1, 1992. Funds will be available within two months from that date. Additional time is needed to allocate funds to non-university researchers.

Stewardship Incentive Program

Federal Stewardship Incentive Program (SIP) funding of up to $10,000 per landowner per year is available to private individuals, groups, associations, corporations, Indian tribes or other legal private entities who own rural lands with existing tree cover or woody vegetation or land suitable for growing such vegetation. The Food, Agriculture, Conservation and Trade Act of 1990 authorizes the SIP to offer cost-sharing assistance to improve management of nonindustrial private forest lands. Landowners must maintain and protect SIP-funded practices for a minimum of ten years. Eligible landowners must have an approved Forest Stewardship Plan and own up to 1,000 acres of qualifying land. (Authorizations must be obtained for exceptions of up to 5,000 acres.) Existing management plans can be modified to meet guidelines. Specific SIP practices approved for cost-share assistance include management plan development, reforestation, forest and agroforest improvement, windbreak and hedgerow establishment and maintenance, soil and water protection and improvement, riparian and wetland protection and improvement, fisheries habitat enhancement, wildlife habitat enhancement, and forest recreation enhancement. For more information contact a state forester, Agricultural Stabilization and Conservation Service office, County Extension office, or Soil Conservation office.