

Summer 1989

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Long-term Research Sites

Editor's note: *Bill Rains* Chair of the UC SAREP Technical Committee and a professor of Agronomy and Range Science at UC Davis, wrote the following article about long-term research sites.

In addition to funding competitive research grants and disseminating information, the UC Sustainable Agriculture Research and Education Program is charged by the California Legislature and its Sustainable Agriculture Research and Education Act of 1986 to answer questions about the long-term affects of our present agricultural practices. These answers can only be obtained through long-term studies on farmland plots.

Agricultural systems are managed, natural systems. In an ecological sense they are disturbed natural ecosystems in which physical and biological resources have been manipulated (farmed) to provide output (products) for the benefit of society. Historically, societies that did not manage their natural resources have failed. The Babylonians salted themselves out of the Fertile Crescent with poor water and irrigation management. These societies raise questions concerning the processes or mechanisms that influence the sustainability of agricultural systems.

To understand these processes, it is necessary to gather information over time. The Rothamsted plots in Southern England are examples of temperate, humid sites where data on continuous cropping have been collected for 150 years. One hundred years of data on continuous cropping have been collected at the temperate, sub-humid Morrow plots in Central Illinois. To date, no comparable long-term plots have been established to study newly opened, intensively irrigated land in a Mediterranean climate anywhere in the world.

In California 70 years of intensive agricultural management has imposed a whole new environment onto the land. Through irrigation, we have transformed the climate of huge sections of the state from dry hot summers to wet hot summers. This has created a great potential for the destabilization of natural resources. California's current farmland environment has not

evolved slowly; it is a product of short-term manipulation which we have not evaluated.

Researchers from UC Davis, UC Santa Cruz, and UC Riverside have identified research and management needs for at least three long-term sites. These sites, which have not yet been determined, will give researchers opportunities to study such issues as (a) the processes that regulate the rates of accumulation and transport of decomposing organic matter; (b) the processes that influence the rates at which inorganic nutrients are taken up, utilized and released by the animal, plant and microbial communities; (c) the effects of environmental variables on the structure and changes in these communities; and (d) the role played by major disturbances in maintaining or

changing the character of ecosystems.

Education is a critical product of long-term farmland research. While the emphasis is on research and data collection over a long period, it is not necessary to wait 50 years for the results to be useful. Information will be gathered and disseminated continuously.

The National Science Foundation has defined the concept of long-term ecological research (LTER) sites and has funded an agricultural site in Michigan under this program. The UC SAREP will provide leadership and seek funding for the establishment of agricultural LTERs in California. It will solicit and fund proposals from various groups and institutions through a competitive review process.

A Request for Proposals will be distributed when the funding and personnel resources are available.

The National Environmental Policy Act states "it is the continuing policy of the Federal Government to use all practicable means and measures to create and maintain conditions under which man and nature can exist in productive harmony." Long-term farmland research is a critical tool in helping California reach this objective.

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Reduced-Input Grape Meetings Planned

UC SAREP is co-sponsoring two meetings this fall for grape growers who are interested in reducing the need for pesticides and other synthetic inputs.

A meeting for the lower San Joaquin Valley is planned by UC Cooperative Extension specialists and advisors who conducted the reduced-input grape meeting in December 1988. That meeting attracted a standing-room-only crowd of 200 small, medium and large growers. This year's meeting, scheduled for October 24 at UC's Kearney Agricultural Center in Parlier, will address principles of vine management and pest management; new approaches such as soaps, oils and vacuum machines; and management of leafhoppers, mites and other key pests. Registration information is available from Norma Ray at Kearney Ag Center, (209) 891-2500.

For north coast growers, University Extension, Cooperative Extension and UC SAREP are sponsoring a reduced-input grape meeting in Santa Rosa on November 14. Topics include site and variety considerations for sustainable agriculture; vineyard floor management; cover crops in relation to weeds, nematodes, and other pests; and management of insects and diseases. More information is available from Debbie Roberts at University Extension in Davis, (916) 757-8899.

UC SAREP Set Research Symposium for March 1990

Since its inception, **UC SAREP** has seen a growing interest and involvement in agricultural sustainability among California farmers, researchers, and extension personnel. A research symposium is planned March 15-16, 1990 in Sacramento to present part of the growing body of information on sustainable agriculture, and to bring together many of the individuals involved in this area. The symposium will also provide a forum for the presentation of results from research funded by the **SAREP** during its first three years.

The two-day symposium will begin with a morning Overview Session in which speakers from California and other states will discuss sustainability from the standpoint of policy, ecology, agriculture, and research priorities. Research reports, based primarily on projects funded by the statewide program over the last three years will be presented in four topical sessions on Systems Research, Information Systems, Soil Management and Pest Management. Discussion periods will follow each session. Additionally, a Poster Session, with published abstracts, will bring together for the first time the wide array of research and extension activities taking place in California that address sustainability goals. More detailed information about the symposium program will be available in the fall, and will be announced in Sustainable Agriculture News.

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"Farmer to Consumer" Conference

The second annual "Farmer to Consumer Conference for the Lower Sacramento Valley" is scheduled September 23 at the UC Davis campus. The day-long conference will feature presentations on agriculture in the Lower Sacramento Valley and grower panels. Additionally, workshops are scheduled on cooperatives, land use issues, farm financing, and organic production and marketing. Others will cover converting to low-input farming, cover crops and soil fertility, "natural" meat and poultry production, seed sources and production for specialty fruits and vegetables, on-farm sales, and value-added products.

The conference will be preceded on September 22 by a regional farm and market tour. The tour and conference are co-sponsored by UC Small Farm Center, University Extension, UC SAREP, California Department of Food and Agriculture, California Certified Organic Farmers, Committee for Sustainable Agriculture, and Organic Market News and Information Service. For registration information contact Debbie Roberts at University Extension, (916) 757-8899.

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SAREP, UC Programs Work for Sustainability

Questions about which University of California departments and programs are involved with the goal of agricultural sustainability are frequently asked by researchers, faculty, farmers, farm advisors, consumers and students alike. The UC SAREP, the statewide sustainable agriculture program, is defined below in addition to some of the programs with which we interact. The programs listed are by no means the only ones in the UC system working with sustainability. We are interested in adding profiles of other, related programs to the partial list provided here.

UC Sustainable Agriculture Research and Education Program (UC SAREP): This statewide program was established by the California Legislature's 1986 Sustainable Agriculture Research and Education Act. The program is charged with addressing concerns about the economic viability of farming and the effects of current farm practices on the environment and on human health. It is responsible for funding competitive research grants, disseminating new and existing scientifically-based information, and the coordination of long-term farmland research. It has funded 29 research, demonstration and education grants since 1987 for a total of \$578,760. Information on alternative farming practices is being identified and entered into a computer database. The program sponsors workshops and publishes newsletters and other documents. Directed by **Bill Liebhardt**, the program is based at UC Davis. The mailing address is UC Sustainable Agriculture Research & Education Program, University of California, Davis, CA 95616. Telephone: (916) 756-7556.

Agroecology Program, University of California, Santa Cruz: The Agroecology Program at UCSC is a research and education group working toward the development of ecologically, socially, and economically sustainable agricultural systems. The program manages two facilities on the UCSC campus: a four-acre garden established in 1967 and a 25-acre farm founded in 1972. The farm is used as a research and teaching facility, and includes row crops, raised-bed gardens, orchards, research plots, and a laboratory. Agroecology is an Area of Concentration within the undergraduate environmental studies major. Graduate students may study agroecology through biology and other Boards of Studies at UCSC. A six-month apprenticeship in ecological horticulture is offered each year through the program. It also offers many informal educational opportunities for farm advisors, farmers, gardeners, school teachers, researchers and faculty at other campuses. Program staff coordinate conferences, teach short courses, and publish brochures and a newsletter. Research at the Agroecology Program focuses on natural ecological principles and agricultural policy issues. Program director is Stephen Gliessman, associate professor of environmental studies. Mailing address: Agroecology Program, University of California, Santa Cruz, California, 95064. Telephone: (408) 429-4140.

Biological Control, a division of the Dept. of Entomological Sciences at UC Berkeley: The University of California's biological control research began in the early 1940s at UC Riverside in the Department of Biological Control. During the 1940s a branch of the UC Riverside department moved to Albany, California near Berkeley. In the early 1960s the UCR biological control group at Albany officially became a division of the Department of Entomological Sciences at UC Berkeley. The division's research is focused on finding, screening and producing natural predators for agricultural and urban pests. The division uses three tactics to approach pest problems: classical biological control, which identifies natural enemies of crop pests; conservation, which strives to conserve the beneficial insects and protect or recreate their natural habitats; and augmentation, the technique of mass culturing and releasing beneficial insects which cannot survive the entire season where they are needed. Researchers produce numerous publications for farmers, farm advisors and consumers as well as help with the production of the statewide Integrated Pest Management project's manuals. **Leopoldo Caltagirone**, professor of entomology, is the division chair. Biological Control is located at the Gill Tract in Albany. Mailing address: Division of Biological Control, University of California, Berkeley, CA 94720. Telephone: (415) 642-7191.

UC Small Farm Program: The nucleus of the statewide Small Farm Program is the Small Farm Center, located on the Davis campus. The Center provides education and outreach materials for farmers, farm advisors, researchers, and consumers who need information on small farm topics. It offers information on cropping systems, small-scale agriculture, organic farming practices, soil fertility, plant nutrition, marketing and specialty crops. The Center co-sponsors statewide events including the *Farm Conference* and the *Tasting of Summer Produce*, and numerous workshops. It offers many free publications and maintains a library. **Ron Voss** is the director of both the Center and the Small Farm Program. The program also includes six designated farm advisors and 40-45 other advisors throughout the state who have specific programs for small farmers. Additionally, each county extension office provides local service to small farmers. The Center's mailing address is: Small Farm Center, University of California, Davis, CA 95616. Telephone: (916) 757-8910.

UCD Student Experimental Farm: Classes, research and extension activities focusing primarily on issues of sustainable, organic, small scale, or international agriculture are conducted at the Student Experimental Farm, a 25-acre plot established at UC Davis in 1977. The Farm offers numerous practical educational opportunities including a seed saving project which preserves endangered varieties, a demonstration garden and a market garden. The Farm sponsors community outreach field days, workshops and conferences including the annual *Women in Agriculture* conference, and seminars on sustainable agriculture practices. It also publishes an annual journal. **Mark Van Horn** is the Farm manager and can be reached at (916) 752-7645. The mailing address is Student Experimental Farm, Dept. of Agronomy and Range Science, University of California, Davis, CA 95616.

UC Davis Sustainable Agriculture Program: This Davis campus program was established by the UC Davis College of Agriculture and Environmental Sciences in January 1989. The program is a vehicle for organizing and

focusing the scientific expertise of UC Davis faculty on research areas related to sustainable agriculture, and fundraising for long-term research in agricultural production systems. The acting director is **Montague Demment**, associate professor of agronomy and range science. The mailing address is UC Davis Sustainable Agriculture Program, Dept. of Agronomy and Range Science, University of California, Davis, CA 95616. Telephone: (916) 752-7757.

UC Statewide Integrated Pest Management (IPM) Project: Dedicated to the reduction of pesticide use, the UC IPM project develops and promotes the use of integrated, ecologically sound pest management programs in California. The Project is a major source of IPM research funds within the University, sponsoring approximately 40 research projects a year targeted at pest problems of agricultural, landscape and urban importance. The Project is also very important in providing statewide coordination of extension IPM activities within the UC system, both through dissemination of California IPM funds and USDA Smith-Lever extension IPM funds and through the activities of its staff. Project staff includes eight regionally-based Area IPM Advisors who work closely with farm advisors and pest management consultants throughout the state to demonstrate and disseminate IPM information and adapt IPM research for local needs. The Project's IPM Education and Publications office develops practical publications and educational materials including integrated pest management manuals for agricultural crops, rapidly updated Pest Management Guidelines for numerous commodities, farmworker pesticide safety videos and publications, and continuing education programs for pest management professionals. The Project maintains a publicly accessible computer system to aid in research and information delivery. Project Director is **Frank Zalom**; the mailing address for the Project Director is IPM/IG, University of California, Davis, CA 95616. Telephone: (916) 752-8350. Information about IPM Education and Publications can be obtained by calling (916) 752-7691.

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Sources of Funding

The UC SAREP will be sending out Requests for Proposals for the 1989 Competitive Grants Program late this summer. Proposals may be for grants up to \$50,000 (per year for multi-year proposals) in the areas of weed management and control, alternatives to fungicides and fumigants, soil nutrient (besides N) alternatives, breeding research, outreach, and dissemination.

Requests for Proposals will be sent to everyone on the Sustainable Agriculture News mailing list, with proposals tentatively due November 1, 1989. Grants will be made February 1990. If you are not on our mailing list, and would like to receive the RFP, please send a postcard to RFP, UC Sustainable Agriculture Program, University of California, Davis, CA 95616.

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U C Davis Creates Sustainable Agriculture Program

Editor's Note: *Sustainable Agriculture News* will run occasional articles from other UC programs which have similar goals. The following article is by Montague Demment, acting director, UC Davis Sustainable Agriculture Program, Department of Agronomy and Range Science.

In January 1989, **Charles Hess**, dean of the College of Agriculture and Environmental Sciences at UC Davis, established the UC Davis Sustainable Agriculture Program. The purpose of the program is to provide a vehicle for organizing and focusing the scientific expertise of the faculty on research areas related to sustainable agriculture, and develop mechanisms to fund long-term research in agriculture production systems. Hess was responding to new societal concern about the long-term viability of our food production systems and their impact on the environment. These concerns are being translated into environmental constraints that will change the nature of our production systems.

The program's establishment signals a new focus for agricultural research on the Davis campus. The comparative stability of cropping systems over the last 40 years has permitted research in agriculture to become increasingly reductionist. The identification of basic physical, biological, and chemical mechanisms forms the foundation of knowledge essential to the future of agricultural advances. However, as production research focuses on greater complexity at lower levels of organization, the results are further removed from the highest and most applied level of integration - the production system. Production systems evolve as units within an environmental, social, and economic context. Because we are now in a situation where the constraints are changing, farm production systems will change. The university needs to refocus its attention to the behavior of the higher levels of organization of these systems in order to properly serve agriculture and society.

The program proposes to accomplish this mission by using vertical integration to organize teams of scientists who will identify and solve problems within the major production systems of California. Knowledge of basic processes, integrated to understand system performance, will serve the two major purposes of the university: advancing fundamental science and addressing society's problems. These studies will occur on the Davis campus and at university field stations. The number of teams will depend upon available funding. The UCD Sustainable Agriculture Program's steering committee is drafting plans for an agricultural preserve on the Davis campus to monitor long-term changes in the components of production systems.

The time is right for a change in direction. California agriculture is being challenged at home and abroad to look at problems with a new perspective

and develop alternative solutions. Agricultural colleges are struggling with compatibility of basic research, applied problems and the future of their mission and support in an increasingly urban constituency. I believe the UCD Sustainable Agriculture Program can make a strong contribution to the resolution of these problems. The College and our society have a substantial capacity to address these concerns, and the program will be actively attempting to refocus and organize resources to meet these complex and critical issues.

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California Organic Marketplace Analysis

Organic commodities represent a small but rapidly growing specialty market in California. Because of the limited size of this industry, little published information is available to describe its current status. As a part of its competitive grants program, UC SAREP funded a 1988 survey of organic growers by **Roberta Cook**, Extension Economist in the UC Davis Department of Agricultural Economics, and **Gretchen Will**, of the Organic Market News and Information Service (OMNIS). This article is excerpted from their report to SAREP on their survey.

From a mail survey of 738 organic farmers in California, 323 were returned, for a response rate of 44 percent. Of the 310 that provided data on their certification status, 170 were certified by the California Certified Organic Farmers (CCOF), and 140 were uncertified organic producers. Larger growers were less likely than smaller growers to have both certified and uncertified acreage: 61 percent of the growers over 50 acres had such mixed acreage. Average farm size of respondents was 58 acres, with only six reporting more than 500 acres. The three predominant areas for organic production were the North Coast, the Central Coast, and the Sacramento Valley, with 29, 19, and 17 percent of the respondents, respectively.

Approximately 41 percent of the producers had been using organic production practices for five years or less; 45 percent had been producing organically from five to fifteen years; and 14 percent for more than 15 years. A larger percentage of growers had less than five years' experience as farm size increased, indicating that the very recent interest in organic farming is no longer confined to smaller producers.

The overwhelming reason reported for producing organically was ecological or health concerns (76 percent), compared to 14 percent who were motivated primarily by financial reasons. Larger producers were more likely to express financial reasons as a significant motivating force.

Just as for conventional growers, the most important marketing channel for organic producers was sales to wholesalers. However, sales directly to consumers represented 21 percent of organic sales, versus one percent of non-organic production. CCOF-certified growers sold the highest percentage of their output through wholesalers or brokers, whereas the most important outlet for uncertified growers was direct to consumers through Certified Farmers' Markets and roadside stands.

One of the purposes of this survey was to obtain an understanding of the factors constraining expansion of the market for organic commodities. To this end growers were asked to indicate both their perceptions of obstacles facing the organic market in general, and their specific marketing problems.

With regard to the former the primary factors as ranked by producers. The top

three factors were: 1) lack of consumer awareness of the benefits of organic produce; 2) limited distribution and availability; and 3) consumer unwillingness to pay a premium for organics. When asked about their own marketing problems, 69 percent reported that they experienced problems of some sort. The most frequently cited problems were seasonal gluts and inability to meet demand. A higher percentage of larger growers, and uncertified growers, reported seasonal gluts as the most important problem.

When asked about their production problems, organic growers most frequently cited: 1) labor requirements, 2) pest problems; and 3) insufficient technical knowledge. As more research is done to support organic farming methods, however, the authors suggest that new methods may be developed to use labor more efficiently, and insufficient technical knowledge may become less of a problem.

Of the growers participating in the survey, 182 asked to be listed in the California Organic Growers Directory, available from OMNIS, P.O. Box 1300, Colfax, CA 95831.

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Marketing Organic Foods in California: Opportunities, Constraints

A survey conducted in 1987 by **Desmond Jolly** and **Howard Schutz**, both of UC Davis, has revealed a number of facts that should be of interest to both farmers and food retailers. The main objective of this survey was to assess consumers' subjective comparisons of conventional and organic foods. Nine hundred forty-six respondents from three California counties responded to questions about: motivations for purchasing organically grown food, frequency of organic food purchases, satisfaction level with various food items, use of product information and labels, and constraints on the purchase of organic food items. Some of the study's most important findings are listed below:

1. Food safety and nutrition are the most important concerns affecting consumers' general food purchasing decisions. Though not as crucial, other motivating factors were (in order of importance): flavor, general healthfulness, and food cost.
2. Considering the specific food constituents related to safety and nutrition, consumers rate their highest levels of concern for chemical residues, irradiation (a form of food preservation), and fat content. Of lesser concern are other food constituents including cholesterol, sugar, and preservatives.
3. Overall, most consumers rate the quality of organic foods as better than conventional. However, relatively few consumers translate these feelings into regular purchases of organic food products.
4. Questions about specific attributes relating to food quality show that a significant group of consumers are making purchase and consumption choices based, in large part, on environmental concerns.
5. There is a definite trend toward increasing production and consumption of organic foods.
6. Most consumers purchase organic foods at health food stores; other important outlets are regular supermarkets, farmer markets, and roadside stands.
7. The most important constraint identified by consumers who once purchased organic products but did not continue, is high price. The other two major constraints are limited access and availability of organic food items.

The authors cite other studies which show that, despite heightened consumer concerns over food safety, behavior patterns (at least in terms of food choices) do not radically change in the short run. While behavior patterns catch up with perceptions, the length of the lag time in California will depend in part upon two developments. These are: 1) inclusion of organic foods as a regular part of the product line of conventional food stores; and 2) product prices which are affordable by a larger portion of the population.

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What *is* Organic?

Organic farming is a production system which largely excludes the use of synthetic fertilizers, pesticides, growth regulators, and livestock feed additives. Organic farmers rely as much as possible on cultural practices such as crop rotations, animal and "green" manures and compost, and natural minerals for soil improvement, and biological and cultural methods of pest control.

In California, state law regulates the marketing of any food that is labeled "organic," "organically grown," "naturally grown," "wild," "ecologically grown," or "biologically grown." The regulations are part of the California Health and Safety Code, sections 26569.11 through 26569.17, enforced by the California Department of Health Services (DHS). Those considering marketing products in this manner should study the detailed requirements of these regulations. A copy is available from DHS, Food & Drug Branch, P.O. Box 942732, Sacramento, CA 94234-7320. In brief, the law requires that no synthetic materials be used on the land or the crop for 12 months before planting (for annuals) or before flowering (for perennials); that detailed records be kept for two years by growers, processors, and sellers; and that specific wording appear on the label.

Due to lack of funding, DHS does not interpret the law (for example, by determining whether a material is permissible or not) or enforce it, except by investigating complaints. Private certifying organizations make their own interpretations and set their own requirements for member growers. California Certified Organic Farmers, with a state office in Santa Cruz and chapters throughout the state, is the largest grower certifying organization in California.

SAREP Names New Public, Technical Committees

The 1986 Sustainable Agriculture Research and Education Act which created the UC SAREP specifically requires that the program have both public and technical advisory committees to advise the University on program goals and to make recommendations on the award of competitive grants. The Public Advisory Committee (PAC) is composed of 21 individuals actively involved in agricultural production, as well as representatives from government, public organizations, and institutions of higher education. The Technical Advisory Committee (TAC), made up of 20 university wide faculty and staff with knowledge and experience in diverse areas related to sustainable agriculture, managed the program until agronomist **Bill Liebhardt** was hired in 1987. The TAC continues to make recommendations about the scientific merit of grant applications and advise the program.

PUBLIC ADVISORY COMMITTEE MEMBERS:

KATHLEEN BARNES is a farmer in Capay, Yolo County. She and her family have an intensive organic operation of mixed tree and vegetable crops. She is interested in soil structure, organic codling moth control and low-input soil fertility.

AUDY J. BELL is a former ranch manager who works as an agricultural consultant in Orangevale, Sacramento County. He has managed cotton, seed alfalfa, wheat, barley, safflower, corn and hay alfalfa. His interests are weed control, crop rotation, insect control, breeding for varietal disease resistance and insect resistance.

BILL BRAMMER is the owner of the Be Wise Ranch in San Diego, 30 acres of mixed orchard and vegetables including oranges, lemon, lime, avocado peach, tomato, squash, and cucumber. The president of California Certified Organic Farmers, he is interested in research showing why and how organic farming methods work, and the conversion of conventional agricultural to organic production.

BOB CANTISANO is a Colfax, Placer County farmer and a researcher and consultant to organic and transitional farmers. He co-farms 65 acres of fruit, nuts, vegetables and forests in the Sierra foothills and is interested in organic management and "closed-loop on-farm fertility." He does on-farm research for organic farmers to help them with production problems, and advises them on methods for making organic farming profitable and environmentally benign.

MIKE CHRISMAN is the chief of staff for Assemblyman Bill Jones and raises plums, nectarines, walnuts and beef in Tulare County.

PHIL DOWD is assistant to the Speaker of the California Assembly. He handles agricultural issues.

FRAN DUBOIS raises rice, small grains, oilseed crops, tomatoes, beans, melons and seed crops in Yolo County. He is interested in all aspects of sustainable agriculture.

STANISLAUS J. DUNDON teaches philosophy at Cal State Polytechnic College, San Luis Obispo. He studies social, institutional, and philosophic constraints on agricultural innovation, and the ethical issues and human values of agriculture. He is interested in sustainability as a new model, and in the changes required in agricultural schools, UC Cooperative Extension and other institutions to deliver new interdisciplinary concepts.

TOM HALLER is Executive Secretary of the Davis-based California Association of Family Farmers (CAFF.) CAFF has been active in supporting sustainable agriculture as an important alternative for small family farmers.

BRUCE JENNINGS is a senior consultant to the California Senate Office of Research. His specialty is agricultural research, higher education and pesticide regulation.

DEBRA JONES is the former executive director of the California Action Network (CAN.) She is interested in the social and economic issues of sustainability, including farm labor and the structure of agriculture. CAN is a non-profit organization interested in promoting sustainable agriculture as an alternative to conventional agriculture, and as a means to bolster California's rural economy.

JAMES A. MEYER is a farmer near Lempoc in Santa Barbara County where he raises mixed vegetables. His 75-acre farm is in transition to organic production. He is interested in transition strategies and on-farm, whole-system research.

JACK PANDOL, JR. farms more than 6,000 acres in Kern and Tulare counties. His principal crops are table grapes, kiwi, Granny Smith apples, Asian pears and almonds. He is interested in advanced water management and irrigation techniques, alternative pest control techniques, and innovative quality control methods.

STEPHEN P. PAVICH, JR. raises table grapes, melons and cotton in Delano, Tulare and Kern counties. He is interested in a systems approach to farming, and wants to see cooperative research among university departments and specialties.

To advise Program, Recommend Grant Recipients

ED SILLS is the owner-operator of a mid-sized family farm in Pleasant Grove, Sutter County. He farms 1400 acres, 600 of which is owned. Crops include rice, corn, popcorn, wheat, oats, vetch and almonds. About 70 percent of the 1400 acres is in organic production. The remaining 30 percent is farmed with varying degrees of low-input or sustainable practices. He is interested in devising systems of production in which the soil is improved through cropping, while maintaining adequate production levels and profitability.

KAY THORNLEY is an owner/member of a 136-acre 13-member organic farm in Davenport, Santa Cruz County. The farm includes 30 acres of organic vegetables, and specializes in dry-farmed fresh-market tomatoes. She is concerned about California's farm labor structure and its apparent non-sustainability.

JOE TOOKER has a biodynamic farm in Capay, Yolo County where he specializes in intensive trellised fruit production. He also raises cashmere and mohair goats for fiber production. A founding member of California Certified Organic Farmers, he was the first biodynamic farmer in the state and is a board member of the Biodynamic Association.

BILL TRACY is Deputy Director of the California Department of Food and Agriculture in charge of animal industry, inspection services, marketing services, and measurement standards. Bill also raises cotton in Buttonwillow, Kern County.

TONY TURKOVICH has a diversified farming operation in Winters, Yolo County. He raises tomatoes, wheat, corn, alfalfa, prunes and oranges.

BILL WITMAN is a diversified conventional farmer in Escondido, San Diego County where he raises citrus, avocados, sweet potatoes, sweet corn, and gladioli. He is interested in reducing chemical inputs.

GEORGE WORK is a rancher and farmer in San Miguel, Monterey County. He raises dryland grain, including barley, safflower, wheat and vetch, has a cow-calf operation, and takes hunters out on fee hunting trips. He is interested in people and management.

TECHNICAL ADVISORY COMMITTEE MEMBERS:

RICHARD BENNET is a UC Cooperative Extension farm and public policy advisor in Santa Rosa, Sonoma and Marin counties. His specialties are dairy management, including disease prevention, milk antibiotic/chemical residue avoidance, and waste management; public policy, including land use and

rural-urban conflict; and water. He is interested in extraneous chemicals in food from animals, animal welfare, and the impact of food animal agriculture on the environment.

LESLIE "BEES" BUTLER is a marketing economist in the Agricultural Economics Department at UC Davis. His specialty is dairy and poultry marketing, with responsibilities for sustainable agriculture, biotechnology and technological change in agriculture.

MONTAGUE DEMMENT is an associate professor in the Agronomy and Range Science Department at UC Davis and is the acting director of the UC Davis Sustainable Agriculture Program. His specialty is nutritional ecology of ruminants.

DAN DESMOND is the County Director of the UC Cooperative Extension office in Sonoma County. His specialty is urban-agricultural interface issues, and a major interest is educating the urban population about the realities of food and fiber production. He also raises walnuts and beef cattle in Lake County.

MARY LOUISE FLINT is director of Integrated Pest Management (IPM) Education and Publications (UC Statewide IPM Project), an IPM Specialist and a Cooperative Extension entomologist. She specializes in biological control of agricultural pests and alternatives to synthetic pesticides, and works to disseminate information to farm advisors, farmers and gardeners. Her special interest is in the reduction of pesticide use.

LOUISE FORTMANN is an acting associate professor of forestry and resource management at UC Berkeley. Her specialty is natural resource sociology. She has worked on common property resources and tree tenure issues in Africa and the U.S. Her research includes resource-dependent communities and agroforestry.

STEPHEN R. GLIESSMAN is the director of the UC Santa Cruz Agroecology Program and is an associate professor of environmental studies. His research includes intercropping, biological control, conversion studies, agricultural development in Latin America and the Tropics, and education and training in organic and low-input agriculture. Additionally, he is interested in a systems approach to agriculture, long-term research plots, the preservation of family farms, and developing methodology for quantifying sustainability.

JAMES GRIESHOP is a Cooperative Extension community education specialist at UC Davis. He specializes in the adoption of innovations, including some related to integrated pest management practices, water management, and community and risk assessment management.

JODIE S. HOLT is an associate professor of plant physiology at UC Riverside where she studies the ecological/physiological aspects of herbicide resistance in weeds, crop/weed competition (especially in cotton/perennial weeds), and weed ecology. She is interested in encouraging reduced use of pesticides.

MARJORIE A. HOY is a professor of entomology at UC Berkeley where she works on the biological control of insects and mites in deciduous crops,

and the genetic improvement of biological control agents. She has worked with grapes, walnuts, almonds, citrus, apples and pears. She is interested in biological control in agriculture, including research needs and funding sources, and the problems in implementing new pest management techniques.

DESMOND JOLLY is a consumer economist with the agricultural economics department at UC Davis. He specializes in consumer survey research, consumer demand for food safety and for alternative food products, agricultural and food marketing, international agricultural development-technology transfer, cooperatives, and project evaluation.

JOHN MENGE is a professor in the Plant Pathology Department at UC Riverside. His main interest is in citrus and he has long been involved in sustainable agriculture issues with citrus growers.

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WILLIAM L. PEACOCK is a UC Cooperative Extension farm advisor in Tulare County. His areas of expertise are table, raisin and wine grape production. He is interested in "keeping the family farm a viable, wholesome way of life."

CAROLYN PICKEL is an UC Cooperative Extension advisor in the Central Coast region. She demonstrates and disseminates IPM information and adapts IPM research for local needs. She has developed IPM research for local needs. She has developed IPM programs for apples, strawberries, cole crops and other vegetables.

D. WILLIAM RAINS is a professor of agronomy and range science at UC Davis and the chair of the UC SAREP Technical Advisory Committee. He is interested in long-term research plots.

JIM RUMSEY is an assistant professor in the Agricultural Engineering Department at UC Davis. His main interests are reduced tillage of row crops, machinery management, teaching agricultural skills to university students, and transitional tree crop farming.

MILTON SCHROTH is a plant pathology professor at UC Berkeley. He specializes in plant bacteriology, biological control and soil-borne diseases.

RONALD E. VOSS is a UC Extension vegetable specialist and director of the statewide Small Farm Program. His specialties are small farms, vegetable systems, farming systems, plant nutrition and soil fertility, and information dissemination. He is interested in land use, soil quality and food safety.

LAWRENCE K. YEE is the UC Cooperative Extension county director in Ventura County. He manages the planning and coordination of sustainable agriculture research and education, youth education, and agricultural/food policy. He is interested in food safety and marketing, natural resource preservation, water quality, and international relationships for sustainable agriculture.

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Nitrate in Groundwater

Nitrate contamination of drinking water is an increasing concern, and has prompted at least two California reports and three UC farm advisor training seminars in the last year. An October 1988 report by the State Water Resources Control Board outlines nitrate/water issues, while a recently released report from the California Department of Food and Agriculture summarizes what is known about agricultural sources of nitrate pollution, and ways to reduce nitrate leaching from fertilized cropland and animal operations. Entitled "Nitrate and Agriculture in California," the study was prepared by a team of government and university experts, including UC's **L.J. (Bees) Butler, John Letey, Stuart Pettygrove, and David Ririe.**

Stu Pettygrove and other UC soil and water specialists led the three training seminars in Fresno and Davis, June 7, 13 and 15, for UC farm and livestock advisors. Each session began with a chronology of studies since the 1960s which found nitrate in California groundwater, and major studies in the 1970s funded by UC's Kearney Foundation of Soil Science and the National Science Foundation (NSF.) The final report to NSF contains "that should be tapped for extension use," said Pettygrove. (UC Leaflet 21136 by **Raymond Coppock** and **Roland D. Meyer**, "Nitrate Losses from Irrigated Cropland," available for \$1.25 from county extension offices, summarizes some of the results.)

The main known adverse effect of nitrate exceeding the drinking water is methemoglobinemia, or "blue baby syndrome" which is potentially lethal to children under three months. There is less evidence for other health effects, such as cancer or birth defects.

At the nitrate seminars **Rollie Meyer** discussed fertilizer management. He said it is important to apply the correct amounts at the right times. Leaflet 21136 estimates the amount of nitrogen removed by some crops, which is a starting point for determining the amount to apply. While fertilization is important, irrigation is critical, since water drives the nitrogen downward. "If you over-irrigate, you have very little flexibility regarding N applications if you want to avoid leaching," said Pettygrove. Irrigating "perfectly" allows more flexibility in fertilization, although it's not clear what happens to excess N.

Regulations are tightening for animal operations, according to UC Riverside **specialist Bill Fairbanks**. Feedlot or manure ponds are treated as prima facie evidence of non-point source pollution by the Environmental Protection Agency. Lagoons are a good way to store manure, as they conserve nutrients and seal themselves against leaching. There is a start-up lag of up to four months before a lagoon seals, however, and freezing or drying will break the seal. It is important not to pump them dry.

Tahoe Fertilizer Workshop

Fertilizer use and management in the Tahoe Basin was the focus of a workshop April 27 at King's Beach, California. The meeting was sponsored jointly by the Nevada Tahoe Conservation District and the Tahoe Resource Conservation District with the assistance of the USDA Soil Conservation Service and the University of Nevada Cooperative Extension. Presentations were aimed at golf course managers, landscapers, and ski slope managers and addressed the impact of nutrient management on the lake's water quality. Speakers emphasized the need for good erosion control through irrigation and vegetation management, and fine-tuning fertilizer applications.

In the introductory talk on nutrient cycling, **Bill Liebhardt**, UC SAREP, presented information on nutrient uptake and soil properties that influence the flow of nutrients through plant ecosystems. Nitrogen and phosphorus cycling were discussed because of their significant influence on Lake Tahoe water quality. The potential for leaching of nitrates emphasizes the importance of fertilizer management in conjunction with water use. The phosphorus cycle emphasizes the need for fertilizer management in conjunction with erosion control. This is due to the abundance of phosphorus in the top 1-2 feet of soil. A recent report of the Lake Tahoe Interagency Monitoring Program listed fertilizer applications as a significant non-point source pollution problem. Applied research and a greater emphasis on the use of slow-release compounds should be the foundation for making management recommendations and appropriate regulations for fertilizer use.

Dan Bowman, University of Nevada, Reno, noted the components of a successful management program for the Lake Tahoe region: 1) use fast release, high soluble fertilizers sparingly; 2) emphasize the use of slow-release forms of nitrogen; 3) know the soil; 4) irrigate carefully, watch the weather; 5) mow no more than one-third of the total leaf area, return clippings; 6) manage for vigorous roots; and 7) monitor groundwater.

Fertilizer management on critical areas (areas particularly subject to erosion) was the focus of a presentation by **Wes Jarrell**, Oregon Graduate Center. The limiting elements in critical areas are likely to be nitrogen, phosphorus, and soil pH. Effective management of these areas will improve erosion control, enhance plant-soil-water relationships, and limit excess nutrients moving through the soil profile as potential contaminants. Critical area management tools are: 1) good selection of plant species; 2) a complete soil survey; 3) access to a soil analysis lab; and 4) plant tissue testing.