University of California
Division of Agriculture and Natural Resources

Sustainable Agriculture Research and Education Program

BIENNIAL REPORT

On the UC Sustainable Agriculture Research and Education Program
to the California State Legislature in response to SB 872
(Chapter 1188, Statutes of 1986)
July 1995 – June 1997

Office (530) 752-7556 • Fax (530) 754-8550
University of California
Office of the President • January 1998

Letter from the Director

SAREP is now in its eleventh year. To reach the sometimes elusive and critical goal of sustainable agriculture for California has meant working with many organizations and individuals throughout the state. Our collaborative work has involved scientific research, extension activities and daily dialogue that contributes to the shift in practices on farms and in consumer actions.

Our greatest successes in the first years of the program were in working with systems-based projects. We were pleased to fund projects that helped identify how agricultural systems worked and showed how their component parts were connected. A key example of that work is the Sustainable Agriculture Farming Systems (SAFS) project, now in its ninth year at UC Davis. SAREP was the first funding source for the SAFS project, which compares organic/low-input/conventional cropping systems. One of its main focuses has been soil quality and microbiology. This research has major implications for all agricultural production systems in California. SAREP has stayed financially committed to the project because of the long-term information it has provided on how soils should be managed.

Our *Biennial Report* on the activities of the last two years shows that our most successful projects have been community-based. We are especially pleased to highlight SAREP's work initiating and working with collaborative, community-based projects in both production agriculture and community and public policy areas.

Premier examples of collaborative work in production agriculture are the Biologically Integrated Orchard Systems (BIOS) and Biologically Integrated Farming Systems (BIFS) projects. In partnership with the Community Alliance with Family Farmers, SAREP helped turn an innovative collaboration it funded in 1988 between two almond-farming brothers and a Merced County farm advisor into BIOS, a voluntary team-management approach to helping farmers solve orchard and farming systems challenges. This collaboration successfully demonstrates what SAREP was set-up to do: help scientists look at alternative production systems growers are using in the field. The fact that California legislation (AB 3383) was passed unanimously and signed by Governor Wilson to start BIFS, which evolved from BIOS, indicates the broad support this concept has within the state. The BIFS funding program is administered by SAREP to help farmers reduce their use of pesticides and synthetic fertilizers. It is funded by US-EPA and the California Environmental Protection Agency's Department of Pesticide Regulation. Its team approach includes farmers, UC farm advisors and researchers, independent pest control advisors, and industry representatives. BIFS helps them develop solutions to problems in the field, and helps agriculture take a voluntary, pro-active approach to solutions.

In 1991, SAREP began to vigorously pursue economic and public policy issues affecting sustainable agriculture. Since that time, projects aimed at community food systems, regional "food sheds" and similar concepts have brought momentum to this important leg of sustainability. Some of the pivotal projects in this area are also community-based and highly collaborative. An outstanding example is the PlacerGROWN Agricultural Marketing project in Placer County. Aimed at identifying the impacts of local food systems on communities and agriculture, the project is attempting to increase consumer awareness and responsibility for their role in creating sustainable communities by educating them on the benefits of purchasing locally produced, processed and distributed food that is geared to seasonal availability. In collaboration with the UC Division of Agriculture and Natural Resources and the Sustainable Communities Consortium, SAREP has initiated a food shed analysis, looking at the structure and functioning of PlacerGROWN.

In the last two years, SAREP has emerged as one of the leaders in expanding sustainable agriculture to include the concept of a community food system—a collaborative effort in a particular place to build more locally based food economies. The program sponsored a widely attended conference on community food systems at UC Davis in October 1996 which showcased the research that has blossomed in this area. A proceedings from the conference will be published soon, and SAREP staff is coordinating a new project to profile a dozen California community food system projects.

SAREP has also funded projects that are both production-oriented and intrinsically tied to community sustainability issues. One of these community-based research projects is a SAREP-funded "win-win" effort seeking to improve the

health of the Tulelake ecosystem while maintaining viable agriculture critical to the region's economy. The project is developing and assessing solutions important to all major stakeholders, including environmental, agricultural and hunting interests.

We're proud of the many projects we've funded over the years (since 1987, SAREP has awarded more than $3.2 million to approximately 230 basic and applied research projects, community development and public policy projects, seminars, field demonstrations and graduate student awards), and pleased that our work has contributed to changes in the state and the University. The current UC Division of Agriculture and Natural Resources Strategic Plan includes several sections that specifically emphasize sustainability.

Now we must think about what we would like California to look like in the next 10 to 100 years. That takes a collective vision on issues such as water and pesticide use, land use patterns, animal management practices and animal waste, farmworker equity, fair prices for agricultural products, and the structural organization of agriculture. These complex issues require cooperation and buy-in from all the people they affect. We believe that community-based solutions are what will keep California agriculture alive and well, and we are committed to supporting those projects.--*Bill Liebhardt, director, University of California Sustainable Agriculture Research and Education Program*.

Mission and Goals

Established in 1986 by the University of California in response to California Senate Bill 872, the Sustainable Agriculture Research and Education Program provides leadership and support for scientific research and education for Californians to produce, distribute, process and consume food and fiber in a manner that is economically viable, sustains natural resources and biodiversity, and enhances the quality of life in the state's diverse communities for present and future generations. In support of that mission, SAREP pursues the following programmatic goals:

- California farmers and ranchers are more able to manage their land and businesses in ways that are economically viable and that protect and enhance both human and natural resources and biodiversity;
- Consumers have a closer connection to agriculture and California's rural and urban communities are strengthened through participation in sustainable food systems; and
- Government programs and policies encourage and support the development of sustainable farms, ranches and communities in California.

SAREP accomplishes these goals using three main strategies:

- **Fund basic and applied research** on sustainable farming and ranching practices and systems, projects that promote mutual understanding and cooperation among urban residents and farmers and policies that impact the sustainability of California agriculture and its communities;
- **Improve farmers' and ranchers' access to new and existing information** with continuing emphasis on practical information, whole-systems orientation, and a combination of scientific and experiential information; and
- **Support the development of community-based food and agricultural systems**, and broad-based university-community collaborations that strengthen these systems.

Public and technical advisory committees advise SAREP on its goals and make recommendations on the award of competitive grants. The Public Advisory Committee (PAC) is composed of 10-18 individuals, the majority of whom represent agriculture as well as government, public organizations, and institutions of higher education. All are knowledgeable regarding the issues and practices of sustainable agriculture. The duties of the PAC include recommending goals and priorities for SAREP, including, but not limited to, reviewing the priority of grant applications. In reviewing grant applications, the primary responsibility of the PAC is to advise whether or not proposals address program goals. The PAC also assists in the development of the annual plan and the five-year strategic plan.

The Technical Advisory Committee (TAC) is made up of 10-18 individuals who are faculty and staff of the University of California and other experts from outside the university, all with knowledge and experience in diverse areas related to sustainable agriculture. The specific duties of the TAC include making recommendations about the scientific merit of grant applications. In reviewing proposals to the competitive grants program, the primary responsibility of the TAC is to advise whether or not proposals are scientifically sound.

Members of both the PAC and TAC are appointed by the Vice President of DANR, who is the President's designee. Nominations for new members are solicited by the SAREP director from current members of the committees, regional directors and campus deans. Nominations are also welcome from individuals throughout the University and the state. Individuals on the Public and Technical advisory committees serve three-year terms with approximately one-third of the members rotating off each year. The diverse composition of SAREP's Public and Technical Advisory Committees reflects the breadth of our goals.This *Biennial Report 1995-1997* highlights SAREP's achievements in FY 1995/96 and FY 1996/97 and includes summaries of SAREP's funded projects during this period.

1997 Public and Technical Advisory Committees

PUBLIC ADVISORY COMMITTEE

Catherine Brandel, Culinary Institute of America, St. Helena
Cynthia Cory, California Farm Bureau Federation, Sacramento
David Costa, farmer, Lemoore
Leonard Diggs, farmer, The Farmery, Forestville
Marion Kalb, Southland Farmers Market Association, Los Angeles
James Liebman, Pesticide Action Network, San Francisco
Ron Mansfield, farmer, Goldbud Farms, Placerville
Andrew Rubin, Cal-EPA, Department of Pesticide Regulation, Sacramento
Bryte Stewart, farmer, Rio Vista
Michael Straus, Straus Family Creamery, Marshall
Brock Taylor, Brock Taylor Consulting, Escalon
Don Villarejo, California Institute for Rural Studies, Davis
Angus Wright, Environmental Studies, California State University, Sacramento

TECHNICAL ADVISORY COMMITTEE

Edith Allen, Botany and Plant Sciences, UC Riverside
Steve Blank, Agricultural and Resource Economics, UC Davis
Caroline Bledsoe, Land, Air and Water Resources, UC Davis
Robert Gottlieb, Pollution Prevention Education Research, UCLA
Blaine Hanson, Land, Air and Water Resources, UC Davis
Tim Hartz, Vegetable Crops, UC Davis
Donald Klingborg, Veterinary Medicine Extension, UC Davis
Craig Kolodge, UC Cooperative Extension, county director, Santa Clara County
Janet Savage, School of Public Health, UC Berkeley
Tom Shultz, UC Cooperative Extension dairy farm advisor, Tulare County
Robert Thayer, Environmental Design, UC Davis

Lucia Varela, UC Cooperative Extension, area IPM advisor, North Coast
Joan Wright, Human and Community Development, UC Davis

Competitive Grants Program

A primary function of the program is to offer grant money for research and education projects. SAREP has awarded over $3.2 million in grant monies for 230 basic and applied projects over the last eleven fiscal years (FY 1986/87 – FY 1996/97). These projects fall into five general categories:

- research and education grants for sustainable crop and livestock systems;
- research and education grants for community development and public policy projects;
- grants for educational events;
- grants for sustainable agriculture graduate awards (SAGA); and
- research grants for biologically integrated farming systems (BIFS).

New and continuing projects funded in FY 1995/96 and FY 1996/97 are summarized here.

Crop and Livestock Projects

Cropping Systems

The Sustainable Agriculture Farming Systems Project

The Sustainable Agriculture Farming Systems (SAFS) Project was established in 1988 to study the transition from conventional to low-input and organic practices. The SAFS project is a long-term, interdisciplinary research project which compares productivity and sustainability among conventional, low-input, and organic systems. Each system is managed using "best farming practices" typical of Sacramento Valley growers. The 28-acre experimental site is located at the Agronomy Field Headquarters, which is less than two miles from the central University of California, Davis campus. The research group consists of 12 faculty and extension members from various departments, three local farmers and two Yolo County farm advisors. Positive effects resulting from low-input and organic management include increased organic matter content, maintenance of a neutral pH, higher microbial biomass and activity, greater aggregate stability, and increases in water-holding capacity. Current research efforts are focused on developing minimum-tillage tomato production methods, alternative weed control tactics, and improved fertility and cover crop management strategies. Funding for the main project is provided by USDA-SARE (Sustainable Agriculture Research and Education) program and UC SAREP.

In 1995 an Information Specialist was hired to coordinate the outreach component of the project. Grants were secured through the Professional Development Program to fund the position and the educational events and materials.

Information generated from SAFS research has been disseminated through workshops, annual field days, field tours, educational materials, peer-reviewed articles, and a World Wide Web homepage (http://agronomy.ucdavis.edu/safs/home.htm). A wide variety of educational materials have been produced, including a slide show, video and quarterly news bulletin. The SAFS Bulletin is distributed to a mailing list of over 1500 agricultural professionals statewide.

A series of six intensive workshops were held in 1995-1997, in which a total of 403 agricultural professionals received in-service training. Since the SAFS project is a research-based project, it functions as both a demonstration trial and a living laboratory for workshop participants. Participants attended lectures, laboratory and field sessions in which recent SAFS project results were discussed. Also, tools and methods for assessing sustainable cropping systems were presented. Educational materials were distributed at all workshops, which included several research publications, tables and graphs, resource lists for alternative management methods, fertility management tools and methods, as well as samples of cover crop seed and inoculates.

The SAFS project has sponsored nine annual summer field days so far, each attended by over 125 participants. The 1997 Field Day had 177 participants including growers, farm advisors, international visitors and scholars, as well as students from the western region.

Steve Temple, specialist, Department of Agronomy and Range Science, University of California, Davis, (530)752-8216, email: srtemple@ucdavis.edu

Kelly Brewer, information specialist, UC Davis
Sean Clark, research manager, UC Davis
Jim Durst, farmer, Yolo County
Howard Ferris, professor, Department of Nematology, UC Davis
Willi Horwath, associate professor, Department of Land, Air and Water Resources, UC Davis
Tom Kearney, UC Cooperative Extension farm advisor, Yolo, Solano, Colusa counties
Karen Klonsky, specialist, Department of Agricultural and Resource Economics, UC Davis
Tom Lanini, specialist, Department of Vegetable Crops, UC Davis
Pete Livingston, specialist, Department of Agricultural and Resource Economics, UC Davis
Jeff Mitchell, specialist, Department of Vegetable Crops, UC Davis
Gene Miyao, UC Cooperative Extension farm advisor, Yolo/Solano counties
Bruce Rominger, farmer, Yolo County
Kate Scow, associate professor, Department of Land, Air and Water Resources, UC Davis
Carol Shennan, associate professor, Department of Vegetable Crops, UC Davis
Ed Sills, farmer, Yolo County
Don Stewart, production manager, Agronomy and Range Science, UC Davis
Rob Venette, postgraduate researcher, Department of Nematology, UC Davis
Ariena van Bruggen, associate professor, Department of Plant Pathology, UC Davis
Frank Zalom, specialist, Department of Entomology, UC Davis

Budget:	FY 88-89	$50,000
	FY 89-90	$50,000
	FY 90-91	$50,000
	FY 91-92	$50,000
	FY 92-93	$37,500
	FY 93-94	$37,500
	FY 94-95	$49,753
	FY 95-96	$37,500
	FY 96-97	$45,661

Suppression of Plant-Parasitic Nematodes in Conventional and Organic Farming Systems

This study is a "piggyback experiment" that makes use of plots in the ongoing Sustainable Agriculture Farming Systems Project. The goal is to determine whether soils in organic farming systems have a greater tendency to suppress plant-parasitic nematodes than do soils of conventional farming systems. Sampling during 1995 and early 1996 revealed that nematode species composition and densities were similar in organic and conventional plots. Seven species of nematode-trapping fungi were isolated from both organic and conventional plots, and there was no evidence that the organic system harbored higher densities of these than did the conventional. Bioassay results showed that many soil samples from both organic and conventional systems were suppressive to root-knot nematode (*Meloidogyne javanica*). Three of the fungal species isolated are effective only against root-knot nematode; another species was effective against both root-knot and cyst nematode (*Heterodera schachtii*).

Bruce A. Jaffee, associate professor, Department of Nematology, University of California, Davis, CA 95616, (530)752-0862, fax: (530) 752-5809, email: bajaffee@ucdavis.edu

Budget:	FY 94-95	$5,155
	FY 95-96	$9,000
	FY 96-97	$5,000

Rotation Length and Organic Transitions

An additional four-year organic rotation was added to the 100-year long-term farmland research experiment at UC Davis. The new organic rotation is being preceded by two years of conventionally managed processing tomatoes and corn. This treatment allows subsequent comparisons between crops under identical organic management but at different stages of the "organic transition" (first vs. fourth year). Progress continues to be made to insert this new rotation into the long-term project. Expected results include a determination of optimum rotation length, and assessment of the relative contributions of soil quality and human factors in transitions to organic farming.

R. Ford Denison, associate professor, Department of Agronomy and Range Science, University of California, Davis, CA 95616, (530) 752-9688, fax: (530) 752-4361, email: rfdenison@ucdavis.edu

Budget:	FY 94-95	$10,000
	FY 95-96	$ 7,000

Use of Cover Crop Mulches in Processing Tomato Production Systems

In recent years there has been a shift in land use on the West Side of the Central San Joaquin Valley. Thirty years ago, more than 60 percent of the land was planted to wheat, barley and safflower. By 1994, however, this percentage had slipped to less than seven percent. Higher value crops, including many vegetables and cotton, are now common in West Side rotations. The increase in these high-value crops has led to fewer additions of organic matter to the soil, more aggressive tillage operations and a reported decline in soil quality. Preserving soil health and improving nutrient use efficiencies are compelling reasons for renewed interest among a number of farmers in more biologically based soil-building alternatives. Although no-tillage vegetable production systems have been successfully developed and used with advantage in a number of cropping contexts throughout the world, very little work has been carried out on no-till techniques in California. This research evaluates the effectiveness of surface organic mulches in no-tillage processing tomato production systems for suppressing weeds without herbicides, providing nutrients and thereby reducing synthetic fertilizer requirements, maintaining optimal soil temperatures for tomato crop growth and productivity and increasing crop water use efficiencies. Companion cover crop screening trials evaluate prospective fall- and winter-growing species mixtures for growth, nitrogen productivity and potential utility in no-till systems.

Jeff Mitchell, UC Cooperative Extension specialist, Department of Vegetable Crops, University of California, Davis, CA 95616, (530) 752-0516, fax: (530) 752-9659, email: mitchell@uckac.edu

Tom Lanini, UC Cooperative Extension specialist, Department of Vegetable Crops, UC Davis
Steve Temple, UC Cooperative Extension specialist, Department of Agronomy, UC Davis
Tim Prather, UC Cooperative Extension regional IPM advisor, Kearney Agricultural Center
Don May, UC Cooperative Extension farm advisor, Fresno County
Kurt Hembree, UC Cooperative Extension farm advisor, Fresno County
Gene Miyao, UC Cooperative Extension farm advisor, Yolo/Solano counties

Budget:	FY 96-97	$4,440

Soil Management, Plant Nutrition and Pest Management

Determination of the Effect of Cover Crops on Lettuce Drop Disease

Lettuce drop is a widespread soilborne disease of lettuce in the Salinas Valley and other coastal lettuce growing regions. The disease causes substantial economic loss when sclerotia, the resting structures of the pathogen, build up in the soil. Resistant cultivars are not available, and growers rely on synthetic fungicides for managing the disease. Cover crops may influence sclerotial levels by either acting as host plants or as organic substrates; in both cases, sclerotia may increase in the soil. Conversely, cover crops may increase soil microbial diversity and actually help reduce disease incidence or severity.

The first phase of the study evaluated selected cover crops to examine whether lettuce drop increased or decreased. These cover crops included Phacelia, two species of vetch, and Austrian pea. Results of this research indicated that these cover crops became significantly infected by this pathogen, resulting in increased lettuce drop. It should be noted that this is a small plot study that used high inoculum density to induce disease. During the second phase of the study, sudangrass, broccoli residues and manure/yard waste compost were also evaluated for disease suppression. Results from this phase of the study indicated that the sudangrass, broccoli residue, and compost did not decrease or increase the percent viability of sclerotia, nor did the treatment show an impact on the lettuce drop incidence of the subsequent lettuce crop.

Steven Koike, UC Cooperative Extension farm advisor, Monterey County, 1432 Abbott Street, Salinas, CA 93901, (408) 759-7356, fax: (408) 758-3018, email: stkoike@ucdavis.edu

Richard F. Smith, UC Cooperative Extension farm advisor, San Benito County
Louise Jackson, associate professor, Department of Vegetable Crops, UC Davis

Budget:	FY 92-93	$3,850
	FY 93-94	$4,530
	FY 94-95	$3,640
	FY 95-96	$3,540

Subsurface Drip Irrigation for Soilborne Disease Management in Lettuce

Many vegetable crop growers in the Salinas Valley are converting to subsurface drip irrigation because of the benefits that it offers. These benefits include greater water use efficiency, incremental and steady application of nitrogen and water, and reduced drainage and nitrate leaching. In addition, previous research by this investigator has shown that subsurface drip irrigation reduces corky root and lettuce drop, two serious soilborne diseases. This project examined the effects of subsurface drip and furrow irrigation on the yield, incidence, and severity of lettuce drop, downy mildew, and corky root on two cultivars of lettuce. Additionally, the project studied the incidence of lettuce drop in fungicide-sprayed and unsprayed plots under both types of irrigation. Results of the study indicated that the incidence of lettuce drop and corky root severity were significantly lower and yields were higher in plots under subsurface irrigation compared with furrow irrigation. Incidence and severity of downy mildew was not significantly different between the two irrigation systems. Under subsurface drip irrigation there were no significant differences between fungicide-sprayed and unsprayed plots. In addition to reducing the lettuce drop incidence, subsurface irrigation can also reduce or prevent fungicide use, thus saving on the fungicide costs for lettuce drop control.

Krishna Subbarao, specialist, Department of Plant Pathology, University of California, U.S. Agricultural Research

Station, 1636 E Alisal Street, Salinas, CA 93905, (408) 758-3018, fax: (408) 758-3018, email:kvsubbarao@ucdavis.edu

Budget:	FY 94-95	$11,000
	FY 95-96	$ 9,000

Alternative Postharvest Treatments for Decay and Insect Control

Consumer demand for pesticide-free produce is increasing while consumers also continue to expect insect-free and decay-free products. This project evaluates the two important benign postharvest treatments, high carbon dioxide atmospheres and heat treatments, for their effects on decay and insect control on grapes, pears, leafy greens, tomatoes, and peppers. Heat treatments are applied to peppers and tomatoes to control decay; Thompson Seedless table grapes are being treated with high CO_2 atmospheres to control Botrytis rot and insects during storage or transport; short-term high CO_2 treatments at lower temperatures are applied to a diversity of leafy greens to control insects; and Bartlett pears are treated with a combination of high CO_2 and heat for control of codling moth.

Marita Cantwell, specialist, Department of Vegetable Crops, University of California, Davis, CA 95616, (530)752-7305, fax: (530) 752-9659, email: micantwell@ucdavis.edu

Elizabeth Mitcham, specialist, Department of Pomology, UC Davis

Budget:	FY 95-96	$13,000
	FY 96-97	$17,384

Fostering Transition Toward Balanced Predator/Prey Mite Populations In Vineyards Using Narrow Range Summer Oil

Spider mites are consistent pests of grapes in California. Dusty conditions and vine water stress, which are common in much of the raisin-producing area of the central San Joaquin Valley, encourage mite outbreaks. Propargite (Omite) is most frequently applied because of its effectiveness on Pacific mite and low toxicity to predatory arthropods, but it has a 30-day re-entry period and is scheduled for cancellation due to the Delaney Clause. Narrow-range summer oils have a very short re-entry period (12 hours) and resistance has never been reported. This project examines whether the use of summer oils will result in lower levels of prey mites while preserving predator mites. If successful, it will provide growers with a way to make the transition from a control program that relies on chemical treatment to one that includes taking advantage of natural predator/prey relationships.

Michael Costello, UC Cooperative Extension farm advisor, Fresno County, 1720 S. Maple Avenue, Fresno, CA 93702, (209) 456-7567, fax: (209) 456-7575, email: mjcostello@ucdavis.edu

Richard Coviello, UC Cooperative Extension farm advisor, Fresno County
Walt Bentley, UC Cooperative Extension regional IPM advisor, Kearney Agricultural Center
William Peacock, UC Cooperative Extension farm advisor, Tulare County

Budget:	FY 95-96	$8,125
	FY 96-97	$8,125

Ecology of a Group of Generalist Predators, the Green Lacewings, and Their Contribution to Biological Control in Almonds and Walnuts

The evolution of pesticide resistance and the environmental costs of insecticide use are motivating almond and walnut growers to seek non-chemical methods of pest control. One such method is biological control, which uses predators and parasitoids to control insect and mite pests. The ecology of generalist predators is, however, poorly understood, making it difficult to manipulate predators for pest control. This project aims to develop an understanding of the ecology of a key group of generalist predators, the green lacewings (family Chrysopidae), in almond and walnut orchards. Furthermore, this project examines the abundance of other dominant species of generalist predators, such as spiders, ants, and predatory mites.

Jay Rosenheim, associate professor, Department of Entomology, University of California, Davis, CA 95616, (530)752-4395, fax: (530) 752-1537, email: jarosenheim@ucdavis.edu

Budget:	FY 95-96	$ 8,000
	FY 96-97	$10,500

Alternate Side Irrigation to Control Root Rot in Avocados

Phytophthora root rot of avocado has devastated thousands of acres of trees in California. Without treatment, tree decline and death can be rapid. Recent work on root rot has centered on breeding resistant or tolerant root stocks, rather than the treatment of currently infected trees. A chemical treatment (Fosetyl-Al, a phosphonate-based fungicide) used as a trunk injection recently lost its Section 18 conditional use permit. Foliar applications of this chemical are expensive and difficult to apply. This project seeks to test the efficacy of using alternate side irrigation to control Phytophthora root rot in avocados. Rather than applying water to the same portion of the tree's root zone during each irrigation event, this experiment applies irrigation water on alternating sides of each tree row. The wet side provides adequate soil moisture levels to prevent tree stress and possible yield loss. The dry side provides poor conditions for the development of *Phytophthora cinnamomi*. Alternating wet/dry cycles are expected to diminish *P. cinnamomi* populations while allowing tree feeder roots to develop and extract soil moisture and nutrients. In addition, the effects of the interaction of greenwaste mulch application with and without alternate side irrigation on Phytophthora root rot are evaluated.

Gary Bender, UC Cooperative Extension farm advisor, San Diego County, 5555 Overland Avenue, Bldg. 4, San Diego, CA 92123, (619) 694-2856, fax: (619) 694-2849, email: gsbender@ucdavis.edu

Matthew Haynes, Agriculture Irrigation Water Management program director, Mission Resource Conservation District, Fallbrook

Budget:	FY 96-97	$10,000

Development of a N-Fertilizer Recommendation Model to Improve N-Use Efficiency and to Alleviate Nitrate Pollution to Ground Water from Almond Orchards

Overfertilization in almond orchards is due, in part, to a lack of reliable tools for measuring tree N status, tree N demand, and soil N availability. The purpose of this project is to provide better tools for distinguishing between fertilizer applications that are essential and those that are excessive, and to provide growers with fertilizer application guidelines to obtain optimum yield while minimizing the potential pollution to the environment. The project conducts field validation of leaf nitrate analysis in almond, while developing an on-site testing protocol, and determines seasonal and total N demand in almonds. Furthermore, the project develops a grower-used PC-based site-specific N

management program.

Patrick Brown, associate professor, Department of Pomology, University of California, Davis, CA 95616, (530)752-0929, fax: (530) 752-8502, email: phbrown@ucdavis.edu

Steven Weinbaum, professor, Department of Pomology, UC Davis
Qinglong Zhang, postdoctoral researcher, Department of Pomology, UC Davis

Budget: FY 96-97 $10,000

The Impact of a Sustainable Agricultural Practice with Grapes on Pesticide Use in California

This project examines the sustainable, non-pesticidal, and economically viable practice of canopy management, primarily conducted through leaf removal, in controlling Botrytis bunch rot in grapes. Changes in agricultural use of fungicides on grapes between 1990 and 1995 are documented through the investigation of the California Department of Pesticide Regulation's Pesticide Use Report. The study also aims to estimate the extent to which leaf removal has been incorporated into standard practice in California, and is conducting an analysis of on-farm costs of leaf pruning vs. fungicide application. Finally, an analysis is being done of the reasons for success or any impediments to further incorporation of this sustainable practice into California agriculture.

Lynn Epstein, associate professor, Department of Environmental Science, Policy and Management, University of California, Berkeley, CA 94720, (510) 643-9224, fax: (510) 642-7428, email: lepstein@uclink.berkeley.edu

Budget: FY 96-97 $8,573

Do Soils Suppressive of Phylloxera Exist?

Grape phylloxera is a serious pest of California vineyards, feeding on grapevine roots and allowing entry of secondary fungal rot organisms. The damage by the insect and rot organisms can kill or severely stunt vines. No work has been done on the community ecology/natural enemy complex of the insect. Anecdotal accounts in California as well as research from eastern Europe in the 1960s and 1970s indicate that there is potential for biological control of phylloxera. This study aims to determine if vineyards exist that are ecologically suppressive to phylloxera, and to begin the process of characterizing the community ecology/natural enemy complex of phylloxera in California vineyards. The project examines whether soils exist that are suppressive to phylloxera growth or secondary pathogen infection, and if so, determines whether management methods can foster this suppression.

Jeffrey Granett, professor, Department of Entomology, University of California, Davis, CA 95616, (530) 752-7650, fax: (530) 752-1537, email: jgranett@ucdavis.edu

David Rizzo, associate professor, Department of Plant Pathology, UC Davis
Donald Lotter, graduate student, Department of Entomology, UC Davis

Budget: FY 96-97 $8,287

Role of the Soil Microbial Community in Suppression of Rhizoctonia Stem Rot Disease in Cauliflower

Fungicides are applied in the greenhouse plant production industries (ornamental and vegetable) to control soil borne plant pathogens. The intense cultural and management practices in these industries also lend themselves to integrated

pest management programs that include the use of biologicals. This project provides an improved means of selecting microbial biological control agents. Researchers build on information from preliminary studies with *Rhizoctonia solani* suppressive soils in a field at the UC West Side Research and Extension Center that have been continuously cropped to tomatoes for ten years. The suppressive quality of this soil is stable but sensitive to mild heat treatments (104°-115°), which provides an unusual opportunity to isolate the microbial components of these soils responsible for disease suppression. Heat-sensitive microbes will be tested singly and in concert for their ability to suppress Rhizoctonia stem rot of Cauliflower in a range of amended soils. Depending upon the results of this work, it may be possible to extend this method to other disease suppressive soils. A simple method of forecasting soil suppressiveness (and lack of it) to certain diseases could have very wide application in crop planning.

Joseph Hancock, professor, Department of Environmental Science, Policy and Management, University of California, Berkeley, CA 94720, (510) 643-9223, fax: (510) 642-7438, email: hancock@violet.berkeley.edu

Andrew Magyarosy, Department of Plant Biology, UC Berkeley

Budget: FY 96-97 $9,200

Impact of Border Companion Plants on Natural Enemy Performance in an Augmentative Biological Control Program in California Strawberries

The $600 million California strawberry industry accounts for 75 percent of fresh strawberries consumed in the U.S. Two-thirds of the crop is grown on the Central Coast and in Santa Maria, where its primary pest is the native tarnished plant bug, *Lygus hesperus*. Current control strategies involve multiple applications of insecticides, including pyrethroids, which are disruptive to natural enemies of other strawberry pests. An alternative, more selective control strategy for the tarnished plan bug may include the use of its natural enemy, *Anaphes iole*, a native egg parasitoid. Augmentative biological control involving periodic releases of natural enemies is a viable non-disruptive alternative pest management strategy but it has shown limited success in agriculture. Failure is partially due to the tendency to treat the release organisms as biotic insecticides with little regard to their biology. This research examines biological constraints in an existing augmentative program for enhancing efficacy. The system includes the herbivore, *Lygus hesperus*, and the native natural enemy, *Anaphes iole*, in California strawberries. Under the existing release program, *Anaphes* does not appear to establish resident populations within strawberry fields, necessitating frequent releases. This research examines the effectiveness of strawberry flowers and border companion plants (planted as nectar sources) as factors that enhance the establishment of resident insect populations of on performance of *Anaphes iole*. Field trials are conducted in collaboration with conventional growers on the Central Coast. Comparisons are made on Lygus densities, fruit damage, parasitism levels and generalist predator populations in strawberry fields with and without bordering companion plants. If successful, this program will provide growers a means of making the transition from conventional to sustainable strawberry farming.

Stephen Welter, associate professor, Department of Entomology, University of California, Berkeley, CA 94720, (510) 642-2355, fax: (510) 642-7428, email: welters@nature.berkeley.edu

Sujaya Udayagiri, postdoctoral fellow, Department of Entomology, UC Berkeley

Budget: FY 96-97 $13,187

Livestock

Assessing the Environmental Risk from Rangeland Cattle Shedding Cryptosporidium parvum in Their Feces

Livestock grazing on California rangeland is central to the economic viability of many ranchers of this state, yet livestock are perceived to be a leading source of microbial contamination for surface water. This water quality issue has reached unparalleled scrutiny with respect to the protozoal parasite *Cryptosporidium parvum*. The life-threatening disease induced by *C. parvum* for immunosuppressed humans, and large municipal water-borne outbreaks of *C. parvum* gastroenteritis in humans, have raised questions among ranchers, government regulators and watershed managers as to whether cattle grazing is a leading source of these water-borne pathogens and how best to minimize these possible impacts equitably.

This research assesses the actual risk cattle grazing has on concentrations of *C. parvum* in surface water and identifies range characteristics that might modify these risks. The project determines whether and under what conditions *C. parvum* oocysts (eggs) shed in the feces of rangeland beef cattle can survive the ambient temperatures typical of California rangeland from spring through fall, depending on the elevation level of the rangeland.

Edward R. Atwill, extension veterinarian, UC Davis Veterinary Medicine Teaching and Research Center, 18830 Road 112, Tulare, CA 93274, (209) 688-1731, fax: (209) 686-4231, email: ratwill@vmtrc.ucdavis.edu

Ted Jones, senior statistician, UC Davis Veterinary Medicine Teaching and Research Center, Tulare County

Budget:	FY 95-96	$4,646
	FY 96-97	$3,320

History of Grazing on the Shasta-Trinity National Forest: Implications for the Future

The objective of this project is to reconstruct the history of grazing on the Shasta-Trinity National Forest and determine the cause for the tenfold reduction of grazing activity in the area. This research also aims to analyze the relationship between federal grazing policy as implemented at the allotment level and changes in the use and management of base properties. This information will provide insight into causes of land use change over the last 100 years. The information developed from this study could be used to demonstrate how reduction in livestock grazing on public land translates to private land use decisions. The data sources for the study include historic USFS documents, archival research and interviews of current and past grazing tenants.

Larry Forero, UC Cooperative Extension farm advisor, Shasta County, 1851 Hartnell Avenue, Redding, CA 96002, (530) 224-4900, fax: (530) 224-4904, email: lcforero@ucdavis.edu

Melvin George, extension range and pasture specialist, Department of Agronomy and Range Science, UC Davis

Budget:	FY 95-96	$5,000
	FY 96-97	$5,919

Controlled Grazing on Foothill Rangelands

This project addresses the expressed needs of northern California livestock producers for research-based information on controlled grazing and sustainable livestock production practices. Through the development of a 250-acre watershed site at the Sierra Foothill Research and Extension Center, this project will demonstrate and document the effects of the application of controlled grazing principles on the foothill rangeland/annual grassland and hillside irrigated pastures of the project area. Furthermore, it will demonstrate how land owners and ranchers can monitor the effects of these practices so that they can decide for themselves whether controlled grazing is appropriate for their business. The project will also address public concerns about the environmental impact of grazing.

The site has been subdivided into 22 rangeland and two irrigated pasture paddocks, fenced, and supplied with water. Research projects are underway which examine the effects of controlled grazing on the environment, livestock performance, and profitability, and an analysis of the potential of spring calving on annual rangeland. The site is also being used as a demonstration project on low-stress livestock handling and appropriate tools and equipment for pasture management and livestock control. Educational projects include the Grazing Academy, which emphasizes the practical application of controlled grazing principles and demonstrates fencing and water innovations.

Roger Ingram, UC Cooperative Extension farm advisor, Placer and Nevada County, 11477 E Avenue, Auburn, CA 95603, (530) 889-7385, fax: (530) 889-7397, email: rsingram@ucdavis.edu

David Pratt, UC Cooperative Extension farm advisor, Solano County
John Maas, UC Cooperative Extension veterinarian, Veterinary Medicine Extension, UC Davis

Budget:	FY 95-96	$21,500
	FY 96-97	$13,500

The Contribution of Ranch Roads, Cattle Trails and Bed Load to the Sediment Budget for a Grazed Watershed in the Central Sierra Foothills

Erosion and sedimentation are natural processes that may be accelerated by land use practices. Livestock grazing is often implicated as a source of sediment in grazed watersheds. This project measures the impact of sediment from dirt roads and cattle trails, as well as bed load sediments in the stream channel as part of the watershed's sediment budget. The utility of sediment traps for rapid, cost-effective monitoring of sediment delivery to stream channels are also measured.

Melvin R. George, extension range and pasture specialist, Department of Agronomy and Range Science, University of California, Davis, CA 95616, (530) 752-1720, fax: (530) 752-4361, email: mrgeorge@ucdavis.edu

Ken Tate, UC Cooperative Extension specialist, Agronomy and Range Science, UC Davis

Budget:	FY 96-97	$5,700

Environmental Fate and Characterization of Selenium Supplemented to Intensively Grazed Beef Cattle

Selenium (Se) deficiency is one of the most common conditions diagnosed in California cattle. The need to supplement cattle and other livestock species with selenium in California is widespread. Failure to provide adequate selenium to cattle results in disease, decreased productivity, decreased feed efficiency, decreased animal welfare, and economic losses to producers, particularly small family ranches. However, there is also widespread concern about the potential for environmental selenium accumulation. This project gathers data describing the environmental fate of selenium supplemented to cattle. Selenium levels will be measured in water flowing through pastures used by selenium-supplemented cattle or pastures fertilized with selenium, as well as plants and soils in these pastures, and compared with control sites. Furthermore, the chemical forms and quantities of selenium in cattle excreta, both from selenium-supplemented and selenium-deficient animals will be determined and examined in greenhouse experiments.

John Maas, veterinarian, Veterinary Medicine Extension, University of California, Davis, CA 95616, (530) 752-3990, fax: (530) 752-7563, email: jmaas@ucdavis.edu

Roland Meyer, soils specialist, Department of Land, Air and Water Resources, UC Davis
Dan Drake, UC Cooperative Extension farm advisor, Yreka

Michael Oliver, research associate, Veterinary Medicine Extension, UC Davis
J. Michael Connor, center superintendent, Sierra Foothill Research and Extension Center, Browns Valley, CA
Gamani Jayaweera, assistant research water scientist, Department of Land, Air and Water Resources, UC Davis
James Biggar, professor emeritus, Department of Land, Air and Water Resources, UC Davis

Budget:	FY 96-97	$14,800

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Community Development and Public Policy

Community Food Systems

Impacts of Local Food Systems on Communities and Agriculture: Reason for the Season

This project is providing important educational strategies to support the PlacerGROWN Ag Marketing Program that is encouraging greater purchasing and production of local agricultural products to create a more stable and sustainable community. The project is attempting to increase consumer awareness and responsibility for their role in creating sustainable communities. Through the development of a regional food guide, consumers are educated about the benefits of purchasing locally produced, processed and distributed food that is geared to seasonal availability. Emphasis is placed on developing baseline data that will assist in measuring the impacts of the PlacerGROWN program over the three years of the project. A historical review of the county food system is being conducted to determine the potential for expanding and diversifying local ag production in a sustainable manner.

Sharon Junge, UC Cooperative Extension County Director, Placer County, 11477 E Avenue, Auburn, CA 95603, (530) 889-7385, fax: (530) 889-7397, email: skjunge@ucdavis.edu

Roger Ingram, UC Cooperative Extension farm advisor, Placer County
Garth Veerkamp, UC Cooperative Extension farm advisor, Placer County

Budget:	FY 94/95	$12,000
	FY 95/96	$10,000
	FY 96/97	$8,000

Community Food Security/Direct Marketing/Urban Gardens

Expanding Direct Marketing Opportunities for Community Food Security and to Reduce Pesticide Use

This project explored direct marketing opportunities for reducing pesticide use and developing community food security in poor and low-income areas. Researchers conducted a feasibility study for developing a community supported agriculture (CSA or subscription farm) structure with farmers who sell at the Gardena farmers' market, located in a mixed low- and middle-income neighborhood in southwest Los Angeles. The results of this research were made available to other farmers' market associations and growers as well as community groups and food security advocates. Based on research results, a program will be developed to encourage farmers' market CSAs throughout California and work with sustainable agriculture groups to highlight such programs as an effective strategy for linking

sustainable agriculture concerns with community food security.

Robert Gottlieb, former professor, UCLA; currently, professor at Occidental College, Los Angeles, (213)259-2712, fax: (213)259-2734, email: Gottlieb@oxy.edu

Marion Kalb, executive director, Southland Farmers' Market Association, Los Angeles
Carolyn Olney, associate director, Southland Farmers' Market Association, Los Angeles

Budget:	FY 94/95	$10,615
	FY 95/96	$10,139

Food Security in Santa Cruz, CA: Building a Foundation for Community Action

This two-year project addresses food security issues in the city of Santa Cruz through research, policy analysis, community networking, and publications to support the development of a local food policy council. Guided by an advisory team that includes local stakeholders as well as experts in food policy and community food security, this project assesses food security in Santa Cruz, including identifying those who are most at risk nutritionally, and the reasons behind this risk. A comprehensive review of local, regional, state, and national programs and policies that affect local food security will be conducted. This information will provide critical background for organizations and communities interested in increasing food security. To ensure that this effort has relevance outside of Santa Cruz, the project plans to produce and disseminate a manual and resource guide on community food security analysis. Finally, a conference will be planned to initiate a Santa Cruz food policy council.

Patricia Allen, outreach coordinator, Center for Agroecology and Sustainable Food Systems, University of California, Santa Cruz, CA 95064, (408) 459-4243, fax: (408) 459-2799

Jackelyn Lundy, associate director, Center for Agroecology and Sustainable Food Systems, University of California, Santa Cruz

Budget:	FY 95/96	$8,560
	FY 96/97	$5,710

Pomona-Inland Valley Council of Churches Food Security Project

The Pomona-Inland Valley Council of Churches is an ecumenical organization composed of 83 member churches throughout the Pomona Valley/Inland Empire Region which responds to the needs of the hungry and homeless with direct services such as food and shelter, and identifies the root cause of these problems in an effort to work toward systemic change. The Food Security Project links to a broader effort to build local food security with the goal that low-income individuals and families can obtain a nutritionally adequate, culturally acceptable diet by moving from an emergency response to hunger to a prevention model. The project aims to address the nutritional needs of impoverished communities through direct food distribution, nutrition education, and cooking classes. The project will also increase the capacity of the community to produce its own nutritious food through on-site nutrition and horticultural training at a local community garden.

Joyce Ewen, executive director, Pomona-Inland Valley Council of Churches, 1753 N. Park Avenue, Pomona, CA 91768, (909) 622-3806, fax: (909) 622-0484

Budget:	FY 95/96	$ 5,000
	FY 96/97	$10,000

Natural Beef: Consumer Acceptability, Market Development and Economics

Current systems of beef production require significant investments in feed grains and fossil fuel in order to "finish" cattle for consumer demand. Since cattle feeding occurs primarily in the plains states, transporting cattle from the region of production reduces income to California rural communities. The increased emphasis on natural, lower fat products by consumers suggests that this is an appropriate time to evaluate the acceptability of a forage-fed, natural beef product.

This project is designed as a community-based program with the primary intention of demonstrating the feasibility of an alternative, sustainable food system that stabilizes family ranchers and rural communities. A broad team of researchers and practitioners are participating in the project, including ranchers and experts from California State University Chico and UC Cooperative Extension. The project aims to evaluate the consumer acceptability of a grass-fed product developed on California annual rangelands, characterize the demographics of the potential market, determine the economic feasibility of this marketing alternative, and develop a marketing plan for producers.

Glenn Nader, UC Cooperative Extension farm advisor, Sutter/Yuba counties, 142-A Garden Hwy, Yuba City, CA 95991, (530) 741-7515, fax: (530) 673-5368, email: ganader@ucdavis.edu

David Daley, professor, College of Agriculture, CSU Chico
Richard Baldy, professor, College of Agriculture, CSU Chico
Sheila Barry, UC Cooperative Extension farm advisor, Tehama County
Larry Forero, UC Cooperative Extension farm advisor, Shasta/Trinity counties
Annette Levi, professor, College of Agriculture, CSU Chico

Budget: FY 96/97 $14,948

Evaluating Farmers' Markets in Low-Income Communities

Despite the benefits of improved access to quality, affordable produce to consumers and additional income for growers, farmers' markets are often difficult to establish and maintain in low-income communities. This research and education project seeks to determine the factors that make for successful farmers' markets in low-income neighborhoods. Case studies of successful inner city farmers' markets from across the country will be developed based upon existing evaluations and extensive interviews with farmers, consumers, managers, and others. Similarly, the project will examine examples in California that have failed or stagnated to determine the factors contributing to their failure or flat sales trends. Results of this study will be made available through publications, presentations, trainings, and technical assistance activities associated with Community Food Security Act funding.

Andrew Fisher, Coordinator, Community Food Security Coalition, P.O. Box 209, Venice, CA 90294, (310) 822-5410, email: asfisher@aol.com

Patrick Madden, executive vice president, World Sustainable Agriculture Association, Los Angeles

Budget: FY 96/97 $9,540

Urban Food Project

The Urban Food Project aims to develop inner city agriculture through the use of vacant and public lands for food

production. A community food system is being developed through the establishment of community supported agriculture, local markets for urban- produced food, and more efficient use of existing urban-produced foods. Five job trainees from BOSS' Homeless Transition Project have received training in intensive farming methods and work with children from a local middle school who participate in the Willard Greening Program, a school garden project.

Yolanda Huang, Willard Greening Project Coordinator, 2122 Prince Street, Berkeley, CA 94705, (510) 549-9121, fax: (510) 841-8096

Julia Ishimaru, Urban Food Project Coordinator, Berkeley

Budget: FY 96/97 $18,225

Rethinking Direct Marketing Approaches to Low-Income Communities and Urban Market Gardens

Small-scale urban market gardening has the potential to strengthen community food security through its visibility and potential to improve access. Of particular concern is the development of direct marketing approaches appropriate to low-income inner city communities that simultaneously support small farming enterprises and potentially link to regional food systems. This research project examines current limitations and potential actions to better connect low-income communities and local, sustainably grown produce. Farmers' market consumers, local residents, and families affiliated with Berkeley Youth Alternatives, a community-based youth organization serving predominantly low-income at-risk youth, will be surveyed to analyze existing food distribution systems, eating habits, and direct marketing participation in low/moderate-income communities. Research and survey data will be analyzed in conjunction with an advisory council of related academics and professionals. The results of the survey will be used to develop a pilot direct marketing project specifically directed toward low-income urban communities.

Laura Lawson, Berkeley Youth Alternatives, 3016 Filbert Street, #2, Oakland, CA 94608, (510) 595-0688, fax: (510) 595-1486, email: llawson@ced.berkeley.edu

Marcia McNally, researcher, Community Development by Design, Berkeley
Alison Lingane, garden coordinator, Berkeley Youth Alternatives, Berkeley
Jennifer Shaw, graduate student, Department of Public Health, UC Berkeley

Budget: FY 96/97 $10,150

Consumer/Youth Education

Market Cooking for Kids: Developing Children's Consciousness of Regional Sustainable Agriculture

Market Cooking for Kids is an innovative cooking and science program for children that combines hands-on education about the biology and production of local seasonal foods, with basic cooking instruction about how to appreciate and prepare these foods. This project provides urban school children, primarily from low-income backgrounds, the opportunity to learn about local agriculture and good nutrition by tasting, preparing, and studying fresh, locally grown fruits and vegetables. This collaborative effort among the San Francisco Unified School District, local restaurants, produce businesses, and farmers' markets offers an integrated approach that will increase the opportunities for participating children to get excited about locally produced foods and feel connected to regional farms.

Sibella Kraus, director, Center for Urban Education about Sustainable Agriculture, 1417 Josephine Street, Berkeley, CA 94703, (510) 526-2788, fax: (510) 524-7153, email: sfpmc@igc.apc.org

Budget: FY 95/96 $ 7,000

FY 96/97 $10,000

Farming, Agriculture and Resource Management for Sustainability

FARMS is a partnership among Sierra Orchards, University of California, Davis, California Foundation for Agriculture in the Classroom and Yolo County Resource Conservation District. The program combines science, agriculture and education in an effort to expand agricultural outreach efforts in youth education. In the FARMS program, high school students from both urban and rural districts are given the opportunity to investigate the interactions among science, technology and agriculture to promote an understanding of progressive agricultural practices and environmental balance. Students are also required to complete a project that gives them experience in designing and conducting research relevant to agricultural issues.

Richard Engel, project coordinator, California Foundation for Agriculture in the Classroom, 1601 Exposition Blvd., Sacramento, CA 95815, (916)924-4380, fax: (916) 923-5318.

Mark Linder, president, California Foundation for Agriculture in the Classroom
Craig McNamara, farmer, Sierra Orchards, Winters, CA
Linda Whent, teacher education supervisor, Department of Agronomy and Range Science, UC Davis

Budget: FY 96-97 $15,000

Land Use and Water Policy

Using Water Transfers to Promote Rural Sustainable Development

Ensuring an adequate water supply in California involves balancing competing agricultural, urban, and environmental issues. Solutions to the state's water problems hinge on the understanding that water is a shared community resource vital to fulfilling individual and public values that must be managed sustainably and equitably. This project aimed to better understand the impacts of water transfers on the communities of origin, the agricultural economy, and the environment by identifying regions likely to lose water and developing criteria for monitoring, measuring, and mitigating impacts. The project also developed water transfer policy alternatives that facilitate the reallocation of water without undermining agriculture, the economic and social well-being of people in rural communities, and the environment. These alternatives contribute to long-term efforts to preserve the quality of land resources in the state, while promoting community and civic participation in the approval process.

Santos Gomez, senior research associate, Pacific Institute for Studies in Development, Environment, and Security, 1204 Preservation Park Way, Oakland, CA 94612, (510) 251-1600, fax: (510) 251-2203

Penn Loh, research associate, Pacific Institute for Studies in Development, Environment, and Security, Oakland

Budget: FY 95/96 $11,000

A Spatially Explicit Vineyard Expansion Model: Addressing Crop Production, Public Policy and Environmental Concerns

In northern California the most widespread agricultural development is in vineyard expansion. Rapid land conversion from open hardwood rangelands to vineyards increases habitat fragmentation which in turn affects the natural

resources that the land currently supports. This research project will develop a spatially explicit GIS model to predict where undeveloped, potentially productive grape-growing land is located and address the consequences of vineyard expansion into these areas for oak woodland habitat and watershed function. This model will also be compared with results from research on modeling future urban expansion to determine where conflicts at the urban-agriculture interface may occur.

Adina Merenlender, UC Cooperative Extension specialist, UC Hopland Research and Extension Center, 4070 University Road, Hopland, CA 95449, (707) 744-1270, fax: (707) 744-1040, email: adina@nature.berkeley.edu

Budget: FY 96/97 $22,000

Socio-Economic Analysis of Rotational Management of Wetlands and Cropland in the Tulelake Basin

A multidisciplinary and community-based research project is underway to assess the feasibility of wetland/cropland rotations as a long-term management option for sustainable coexistence of irrigated agriculture and wetland reserves in the Tulelake Basin, in Siskiyou and Modoc counties. This research, as part of the larger project, will develop an assessment modeling framework combining GIS-based economic, hydrologic, and environmental models for estimating the effects on farm profitability and overall economic activity, and the environmental changes for different management options. Interviews will be conducted to document positions and values about agriculture and wildlife in the area. A GIS database and digital map for the region including information on topology, climate, infrastructure, crop and wetland history, and other relevant information will be developed. The project aims to create and implement innovative cost/benefit frameworks that incorporate spatial and temporal aspects of potential trade-offs and threshold boundaries for management decision-making. Agency personnel and advisory groups representing farming, environmental, and hunting interests will be involved in all stages of the project. Approaches developed here have potential application to other areas where agriculture and conservation reserves coexist.

Carol Shennan, former associate professor/physiologist, Department of Vegetable Crops, University of California, Davis, CA 95616, (530) 752-7566, fax: (530) 752-9659. Now director of the Center for Agroecology and Sustainable Food Systems, UC Santa Cruz)

Michael W. Gjerde, Department of Agriculture and Resource Economics, UC Davis
Collin Boda, Energy and Resource Group, UC Berkeley

Budget: FY 96/97 $14,440

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Grants for Educational Events

In 1996 and 1997, SAREP supported 19 educational events by providing a total of $28,465 in small grants. Grants were awarded to Cooperative Extension personnel and non-profit educational organizations which provided practical information about sustainable farming and ranching practices and community economic development. Final reports from 1996 show that more than 450 individuals participated in the events funded through these grants. Attendance figures for 1997 were not available at the time this report was written. The specific meetings funded in each year are listed below.

1996 Grants for Educational Events

A Mobile Workshop on the Scientific Basis of The Conversion Process of High Input Conventional Systems to Agroecological Management. Miguel Altieri, Department of Environmental Science, UC Berkeley. $1,000

Sustainable Production in the San Joaquin Valley: Grapes, Citrus, Nut Crops, and Stone Fruits. Mark Freeman, UC Cooperative Extension, Fresno County; Michael Costello, UC Cooperative Extension, Fresno County. $2,000

The California Grazing Academy. Roger Ingram, UC Cooperative Extension, Placer/Nevada counties. $1,000

The Lighthouse Farm Network Educational Events. Jill Klein, Richard Reed, Lighthouse Farm Network, Community Alliance with Family Farmers, Davis. $5,000 to support the following meetings:

- On-Farm Composting Demonstration (Hollister)
- Biological Control of Artichoke Plum Moth (Davenport)
- Beneficial Insect Identification (in Spanish) (Salinas)
- Beneficial Insect Release and Identification in Citrus (Orange Cove)
- Cover Crop Planting and Mowing Demonstration (Fillmore)

Determining the Cost of Forage Production and Grazing Land Rental to Maintain Sustainable Beef Cattle Operations. Stephanie Larson, UC Cooperative Extension, Sonoma County. $1,000

Workshop on Agriculture/Wetlands Coordination in the Tulare Lake Basin. Douglas Parker, Department of Agriculture and Resource Economics, UC Berkeley; Lee Fitzhugh, Department of Wildlife and Fisheries Biology, UC Davis; Bruce Roberts, UC Cooperative Extension, Kings County; Allan Fulton, UC Cooperative Extension, Kings County. $1000

Sustainable Practices Marketing Initiative. Paul Vossen, UC Cooperative Extension, Sonoma County; Michael Dimock, Sunflower Strategies. $1,000

A Workshop on Vertebrate Pest Management in Agriculture. Desley Whisson, Department of Wildlife, Fish and Conservation Biology, UC Davis. $1,000

1997 Grants for Educational Events

Baled Straw as an Energy Efficient Alternative Material for Low-Cost Construction in Rural Communities. William Brooks, Central Coast Conservation and Development Council, Morro Bay [Workshop held in Salinas]. $1,000

Jubilee Farm Project. Linda Chase, Stockton Emergency Food Bank, Stockton. $1,000 to support the following meetings:

- Composting
- Biological Pest Control

Fighting New Pests of Avocados Biologically. Jan Dietrick, Dietrick Institute for Applied Insect Ecology, Ventura [Workshops held in Santa Paula and Santa Maria]. $1,530

The California Grazing Academy. Roger Ingram, UC Cooperative Extension, Placer/Nevada counties. $1,000

The Lighthouse Farm Network. Jill Klein and Judith Redmond, Community Alliance with Family Farmers, Davis. $5,000 to support the following meetings:

- Doing Research on Your Farm (Woodland)
- Biological Control of Strawberries on the Central Coast (Watsonville)
- Beneficial Insect Identification and Worker Safety Training (in Spanish) (Madison)
- Integrating Livestock on the Farm (Hollister)

- Building Soil Fertility with Cover Crops and Compost (Porterville)

Producing Wool to Meet Organic Standards for the Sustainability of the Sheep Industry. Stephanie Larson, UC Cooperative Extension, Sonoma County. $1,000

Integrated Nutsedge Management. Milt McGiffen, Department of Botany and Plant Sciences, UC Riverside; Carl Bell, UC Cooperative Extension, Imperial County. $935

Commissioning of An Advanced Integrated Wastewater Ponding System for the Treatment and Reclamation of Dairy Waste at Kehoe Dairy, Point Reyes National Seashore, Marin County, California. William Oswald, Department of Environmental Engineering and Public Health, UC Berkeley. $1,000

PlacerGROWN Farm Conference. Bob Roan, PlacerGROWN, Placer County. $1,000

Cover Cropping on the Central Coast. Kristen Schroeder, San Mateo Resource Conservation District. $1,000

Yellow Star Thistle Forum II. Cathy Darling, San Luis Obispo County Department of Agriculture; Brenda Ouwerkerk, Agriculture Commissioners Office; Michael Smith, UC Cooperative Extension, San Luis Obispo County. $1,000

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Sustainable Agriculture Graduate Awards

In 1992, SAREP began awarding small grants to graduate students pursuing research in sustainable agriculture. The Sustainable Agriculture Graduate Awards (SAGA) have been a good way for SAREP to use scarce resources as they complement already existing money within the university and help graduate students address critical issues facing agricultural producers and society. In FY 1995/96, six graduate students were awarded a total of $10,250 for sustainable agriculture projects:

Daniel Carroll, International Agriculture Development, UC Davis, $1,565 for "The Effects of Health and Safety Regulations and Labor Management Practices on Production Agriculture in California: A Case Study of Winegrape Operations in Sonoma and San Joaquin Counties."

Jacqueline Chu, Department of Geography and Environmental Studies, San Jose State University, $900 for "Social and Environmental Restoration through Urban Therapeutic Gardens."

Clara Nicholls, Department of Entomology, UC Davis, $2,000 for "An Agroecological Strategy for the Conversion of Commercial Flower Production Systems to Low-Input Organic Management."

David Smethurst, Department of Geography, UC Berkeley, $2,000 for "The Effect of Changes in Landholding Patterns and Land Use on Vegetation in El Dorado County."

Jennifer Thaler, Department of Entomology, UC Davis, $1,939 for "Artificial Stimulation of Host Plant Defenses in Cultivated Tomato and Effects on the Herbivore and Natural Enemy Community."

Lynn Wunderlich, Department of Entomology, UC Davis, $1,846 for "Evaluating Release Techniques for Efficient Delivery of Green Lacewings (*Chrysoperla rufilabris*) for Control of Mealybug on Grapes (*Pseudococcus maritimus* [Ehrhorn]) and (*Pseudococcus affinis* [Maskell]): An On-Farm Study of Augmentative Biocontrol."

In FY 1996/97 one graduate student was awarded a SAGA grant:

Jo Ann Baumgartner, Department of Environmental Studies, San Jose State University, $2,000 for "Birds and Anthropod Predation of Codling Moth in Sustainable Apple Orchards."

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Biologically Integrated Farming Systems (BIFS) Program

On September 28, 1994, Governor Pete Wilson signed Assembly Bill 3383 (Bornstein, Brown, and Snyder). The bill requested the Regents of the University of California to establish a pilot demonstration program to provide extension services, training and financial incentives for farmers who voluntarily participate in pilot projects to reduce their use of agricultural chemicals. The resulting program is known as Biologically Integrated Farming Systems (BIFS). Funds were provided from the U.S. Environmental Protection agency (US-EPA) and the California Department of Pesticide Regulation's Food Safety Account to support the first two pilot projects. A full report to the California State Legislature (January 1997) describes the implementation of the BIFS program between January 1995 and December 1996. Key points are summarized here.

The University of California Sustainable Agriculture Research and Education Program (UC SAREP) was selected to administer the pilot program. A 13-member program advisory review board was appointed and policies and procedures were developed in accordance with the legislation to identify the first two pilot demonstration projects. The program director selected, with advice from the program advisory review board, the first two pilot demonstration projects: one involving winegrapes in the Lodi-Woodbridge Winegrape Commission ("Winegrape BIFS") and one involving cotton and row crops in the West Side of the San Joaquin Valley ("West Side BIFS").

Winegrape BIFS

By the second year of the Winegrape BIFS project, 40 growers have allocated 56 vineyards as BIFS demonstration sites, a total of 2,023 acres. These 40 growers manage about 50 percent of the acreage of vineyards in the Lodi-Woodbridge Crush District #11. Cover crops and monitoring of pests, two practices noted in AB 3383 as characteristics of the desired farming systems, are used in over 90 percent of the Winegrape BIFS vineyards. In-season pest monitoring and a computer database for managing the monitoring information are particular strengths of this project.

West Side BIFS

The West Side BIFS project involves twelve farms that manage a total acreage of approximately 90,000 acres. Each farm has dedicated field sites of 80 acres or more to BIFS—a total of 1,653 acres in 17 field sites. The most notable success in this project is in the area of soil-building. All 17 BIFS plots received either compost (13 plots) or a cover crop (4 plots). At each site, BIFS plots are managed side-by-side with a conventionally managed plot making a total of 34 plots to be monitored for multiple parameters indicative of soil quality and pest population dynamics. During the first year, a majority of the farms were planted in processing tomatoes; in the second year, they were planted in cotton. During the second year, an intensive IPM monitoring program (including pest and beneficial arthropod species) was developed for the BIFS and conventional demonstration plots. This information was then distributed as a weekly report to all participating growers in an extension document entitled "Outstanding in Your Fields."

First year results from both projects have been reviewed by the program advisory review board and the program director. Specific suggestions and requirements for continued funding have been identified and communicated to the project coordinators.

Future Activities

New funding from US-EPA and the University of California Division of Agriculture and Natural Resources now permits SAREP to fund at least one additional project for up to three years. A new Request for Proposal is being developed and will be released in early 1998 for funding by mid-1998.

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Information, Education and Outreach

SAREP works with a variety of organizations and groups within and outside the University of California to educate farmers, extension professionals, public policy makers and others about sustainable farming and ranching practices, community economic development, community food systems, and other topics related to sustainable agriculture. SAREP staff have put a high priority on working collaboratively with colleagues in the UC Division of Agriculture and Natural Resources as well as farmers and community organizations, to address issues of concern to California's agriculture. These outreach efforts complement and extend the research projects SAREP is supporting.

Publications

To fulfill its mission of disseminating new and existing information to help California growers adopt sustainable farming practices, SAREP's staff has produced a large number of books, bulletins, booklets, brochures, videotapes, slide presentations and databases. Products available are listed here.

Newsletter

Sustainable Agriculture, SAREP's three-times-a-year newsletter, is the program's regular venue for communicating with its constituency. The newsletter includes reports on research projects, workshops and meetings funded by SAREP, as well as commentaries, updates on research and extension activities of UC Cooperative Extension and other organizations, and lists of funding sources and written and electronic resources. A Technical Reviews section includes abstracts of scientific articles and original reviews of research. Issues from the last nine years are in available in printed form (circulation is approximately 2,000) as well as on the program's World Wide Web site. Printed copies are sent free to anyone who requests it (a donation is requested of foreign subscribers).

Web Site

One way to access specific information from SAREP's resources is to search for it electronically. Our World Wide Web site on the Internet (http://www.sarep.ucdavis.edu) allows users to search for and view information on more than 560 separate pages of SAREP-funded research and education projects, databases, requests for proposals, and articles from nine + years of newsletters (most of which are also available in printed form). The site has received two national awards, including a silver award from Agricultural Communicators in Education in 1997, and a bronze award from the Council for Advancement and Support of Education in 1996. Both awards particularly honored SAREP for the Web site's user-friendly approach.

Conferences, Workshops, Speakers

Current research results and practical information are shared in conferences, workshops, field days and other educational programs. In the last two years, SAREP has collaborated with other university and non-profit groups in planning a number of these events reaching a variety of audiences. In addition to the events funded through our grants, SAREP was a major sponsor in the following programs:

Farm Conference

13th Annual Farm Conference, February 23-25, 1996, Visalia, Calif.

14th Annual Farm Conference, February 18-20, 1997, Riverside, Calif.

The conference covers aspects of sustainable crop and livestock production, local marketing, and farm management. Attendance at these events is about 400. Co-sponsored with UC Small Farm Center, UC Cooperative Extension, Southland Farmers' Market Association, California Federation of Certified Farmers' Markets, Community Alliance with Family Farmers, Marin County Farmers' Market Association, Ventura County Certified Farmers Markets.

Dairy Grazing Workshops

August 17, 1996, Tomales, Calif.
August 19, 1996, Orland, Calif.

SAREP worked with several UC Cooperative Extension advisors (Stephanie Larson, Barbara Reed, David Pratt, and Roger Ingram) to bring this program to about 30 producers in two locations. The program was specifically targeted toward producers who are interested in improving their dairy businesses and learning more about the techniques and profitability of controlled grazing systems. Instructors included William Murphy, a dairy grazing expert from the University of Vermont.

Community Food Systems: Sustaining Farms and People in the Emerging Economy

October 2-3, 1996, Davis, Calif.
This event was attended by about 200 people, primarily from California, but also from other parts of the U.S. It showcased a variety of community food systems projects from California and provided an opportunity to explore questions and issues surrounding their development. The program featured several renowned keynote speakers, panel presentations and workshops. Co-sponsored with Community Alliance with Family Farmers, Community Food Security Coalition, and the UC California Communities Program.

Sustainable Agriculture Education Workshop and Information Fair

November 22, 1996, Davis, Calif.
This workshop brought together sustainable agriculture educators working with various audiences around the state. About 70 participants heard about the innovative educational efforts currently being conducted in California, and discussed how to work together to improve the quality and effectiveness of their educational activities and programs. The program included an educational materials fair, and breakout sessions for educators working with similar audiences. A major outcome of this event was a *Directory of Sustainable Agriculture Education Programs in California*, available as a print publication and on-line through the SAREP Web site. Co-sponsored with the UC Vegetable Research and Information Center, the UC Fruit and Nut Research and Information Center, the UC Davis Student Experimental Farm, California Department of Food and Agriculture's Fertilizer Research and Education Program, Community Alliance with Family Farmers, California Association of Resource Conservation Districts. Funded by the Western Region USDA Sustainable Agriculture Research and Education program.

California Biosolids Conference

January 29-30, 1997, Sacramento, Calif.
SAREP participated on the planning committee for this major event. About 300 people came to this conference to learn about the scientific and practical aspects of using biosolids as a fertilizer and soil amendment. Topics included crop and soil responses to biosolids; institutional, legal liability and economic uses; and practical experiences with biosolids. Co-sponsored with California Department of Food and Agriculture, California Environmental Protection Agency, California Water Environment Association, and Central Valley Wastewater Managers Association.

Ag Tech 97

May 21, 1997, Davis, Calif.
Agtech 97 was a one-day event showcasing technological innovation in agriculture. It was held at the UC Davis campus, and hosted by the Department of Pomology and Department of Biological and Agricultural Engineering. SAREP coordinated sessions on how to use the World Wide Web to obtain information on sustainable agriculture, integrated pest management, UC publications, and other marketing and production topics. These sessions were attended by approximately 40 people.

In addition to the above meetings, SAREP staff have participated as speakers, moderators and organizers in numerous workshops and conferences in the last year. SAREP also facilitates direct outreach to farmers, ranchers and communities through its grants programs (see Competitive Grants section).

Outreach to Farmers, Ranchers and Educators

As a statewide program of the UC Division of Agriculture and Natural Resources, SAREP works through the network of local Cooperative Extension (CE) advisors to reach farmers and ranchers throughout the state. We provide funding for various educational programs conducted by CE advisors and other agricultural professionals, and supply information and educational materials they can use in their work with their clientele. In addition, SAREP is involved in

other educational projects that extend information to various audiences around the state. These are:

SAREP staff member Robert Bugg points out beneficial insect activity in a BIOS almond orchard. (L to R: Jill Klein, Robert Bugg, Cindy Lashbrook, and Paul Feder).

Biologically Integrated Orchard Systems (BIOS)

Biologically Integrated Orchard Systems, or BIOS, is a technical assistance program coordinated by the Community Alliance with Family Farmers (CAFF). It demonstrates the viability of farming systems that rely on sharply reduced chemical inputs, and the power of linking agricultural institutions to work toward a common goal. BIOS projects for almonds and walnuts, the second and ninth biggest food crop users of pesticides in California, are established in seven counties. Since the founding of BIOS in 1993, similar initiatives have begun in grapes, cotton, row crops, prunes, and citrus. SAREP Director Bill Liebhardt and staff member Robert Bugg serve on the management teams of the almond BIOS projects in Colusa County and San Joaquin County, respectively.

FARMS

SAREP staff have also participated as mentors and advisors to the FARMS program, a joint project of the California Foundation for Agriculture in the Classroom, Sierra Orchards, the University of California, and the Yolo County Resource Conservation District. FARMS (Farming, Agriculture and Resource Management for Sustainability) provides a unique opportunity for high school students to learn about agriculture, its social and economic significance, and particularly, its links to human health and the environment. Participating students spend time on farms, work closely with their teachers, local agriculturalists and mentors to develop and conduct research projects, and learn about agricultural science and farming at various workshops throughout the year. There are currently five high schools involved in the program. SAREP provided financial support for this project in 1996-97 (see Project Description in Competitive Grants Section).

Western Region SARE Professional Development Program

SAREP has undertaken several projects that follow the *Statewide Plan for Professional Development and In-Service Education in Sustainable Agriculture* published in 1994. We are producing educational resources that advisors and Natural Resources Conservation Service (NRCS) field staff can use in their extension work with farmers and ranchers around the state. Small grants have also been awarded to support professional development activities that take place through UC workgroups and continuing conferences and through NRCS channels. Major support for these activities has come from the Western Region USDA Sustainable Agriculture Research and Education program (SARE).

Support of Community Food Systems

California, a leader in global agriculture, also boasts a growing number of local efforts to reconnect agriculture and community, food and place. SAREP has supported these "community food systems" initiatives as they have developed throughout California during the past few years. A community food system is a collaborative effort to integrate

agricultural production with food distribution in order to enhance the economic, environmental, and social well-being of a particular place (i.e. a neighborhood, city, county, or region). These collaborations typically address several of the following goals: community food security (access by all community members to a nutritious, affordable diet through local, non-emergency sources); sustaining family farms using production practices that are less chemical and energy-intensive; promoting direct marketing between farmers and consumers; community economic development; farm labor equity; and farmland protection. SAREP has been working with Cooperative Extension advisors, community development practitioners, nutritionists, youth and public health professionals, economic development planners, church personnel, academics and others to address the multiple goals that mark a "community food system."

- Community Food System Survey/Profiles

In 1996, SAREP conducted a survey to identify and profile the existing community food systems initiatives in California. From over 100 organizations contacted, we developed complete profiles of 13 projects that met our criteria. The profiles include an overview and contact information about each organization, area served, collaborators, the mission and activities of the project, its efforts in information development, institution building, its budget and staffing, funding sources, effects on the community, lessons learned, future goals and future needs. A SAREP publication, *Community Food Systems in California: Profiles of 13 Collaborations* has just been published. This document will be useful to the many communities that are interested in initiating their own community food systems.

- Food Policy Councils

A number of communities in California are forming new coalitions to provide oversight and to act as catalysts around local food and agricultural policies and programs. Potential goals include: ensuring all residents' access to affordable and nutritious food; exploring the economic potential of the local food industry; educating consumers about the nutritional and environmental implications of their food choices; minimizing the negative environmental consequences of agricultural and food production, transportation and waste disposal; increasing urban agriculture; reducing the reliance on the emergency food system; strengthening links between urban and rural areas; preserving farmland; and promoting sustainable agricultural practices. SAREP has provided technical assistance to community groups in Marin and Santa Cruz counties to help them develop local food policy councils.

- School Gardening Programs

SAREP has provided technical assistance to several schools, particularly St. Peter's Elementary School in Sacramento, in developing school gardens and providing related food and agricultural education that fits into their curriculum. SAREP has also been interested in facilitating relationships between local farmers and school food services so that school children might have access to fresher, local foods in their school lunch programs. An informational brochure about linking school food service and local farmers was developed jointly by SAREP and the Small Farm Center.

- Urban Gardening Research

In early 1997, SAREP and the UC California Communities Program initiated a research project to examine the community economic development potential of "entrepreneurial community gardens." Innovative programs throughout the country are using gardens to create jobs, provide job training, and spawn value-added businesses or other economic development activities. This kind of community garden will continue to proliferate as welfare reform increases the need for communities to create jobs, job training and food security for their residents. The purpose of our research project was to identify and interview the existing entrepreneurial garden projects that have pursued economic development strategies, with a particular emphasis in California; to quantify, as accurately as possible, the costs and benefits of such projects, and to describe the conditions under which they thrive and fail. We are particularly interested in specifying the resources and expertise that go into the most successful entrepreneurial gardens so that other communities might more accurately gauge their own abilities to initiate such

projects. We are now in the process of consolidating all of our data and formulating our conclusions. In our final report and publication, we plan to describe a clearer picture of the economic development potential of these gardens and highlight some of the lessons that may be applicable to other community settings.

- Community Food Security workshops

SAREP worked with the National Community Food Security Coalition to provide five all-day community food security trainings (one in Portland, Oregon; one at Asilomar; two in Los Angeles and one in Oakland) to community groups interested in initiating community food security projects. Information was shared about the concept and practice of community food security. Many workshop attendees have applied for the USDA's Community Food Security grants program or SAREP's competitive grants program to support their projects.

Financial Information

	FY95/96	FY96/97
INCOME		
Permanent State and UC Funding	$649,589	$651,891
Temporary Budgetary Savings	-29,232	-29,335
One-Time Funding From State Legislature for Competitive Grants	0	450,000
Total Income	$620,357	$1,072,556
EXPENSES		
Grants	$204,955	$349,737
Grants Carryforward to 97/98	0	300,000
Information Development and Dissemination	278,319	230,714
Program Expenses*	137,083	192,105
Total Expenses	$620,357	$1,072,556
EXTRAMURAL FUNDING		
Community Alliance with Family Farmers Foundation	$6,000	$0
Kellogg-California Alliance for Sustainable Agriculture	17,150	0
SARE (Statewide Strategic Plan)	12,000	10,000
SARE (Western Region-Professional Development Coordination)	111,146	99,725
SARE (Western Region-Professional Development Curriculum)	0	43,534
DPR/EPA (Biologically Integrated Farming Systems Project)	656,600	0
EPA (Biologically Integrated Farming Systems Project)	0	195,000
California Department of Food and Agriculture	14,775	20,000
Total Extramural Funding	$817,671	$368,259
OTHER FUNDING		
Community Food Systems Conference Registration Fees	$0	$9,450
Sales of Publications and Other Misc Income	3,338	1,895
Total Other Funding	$3,338	$11,345

*FY 96/97 program expenses increased due to building assessment of $30,625 paid to cover FY 95/96 and FY 96/97, and the creation of the Grants Manager position, per SAREP's review recommendation.

Publications List

The folowing is directly from the 1995-1997 Biennial Report. You can find most up-to-date information on SAREP's products at the Publication and Videotapes section of our web site.

Printed Publications

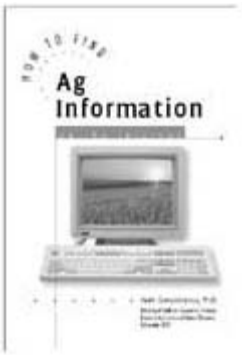
[Note: the first four publications were produced after July 1997, the period of this report.]

Community Food Systems in California: Profiles of 13 Collaborations

Publication 21574, 1998

This publication profiles 13 of the growing number of local community food system initiatives that have developed in California in the last few years. The publication aims to provide basic information that can assist individuals or groups interested in starting similar projects in their regions, including Cooperative Extension advisors, community development practitioners, nutrition, youth and public health professionals, economic development planners, church personnel, academics and others. The organizations profiled have well-developed roots in a geographically distinct community, a holistic and comprehensive approach to addressing goals, and the cooperation of multiple organizations and individuals. They address several of the following goals: community food security (access to a nutritious, affordable diet), sustaining family farms using production practices that are less chemical- and energy-intensive; promoting direct marketing; community economic development; farm labor equity; and farmland protection. 45 pages. Editors: Gail Feenstra and David Campbell. Price: $6.00. Order through UC DANR Communications Services.

How to Find Agricultural Information on the Internet



Publication 3387, 1997

This useful manual is designed for farmers, ranchers, gardeners, extension agents, consultants, and scientists who want to get results using the Internet. Aimed at both Internet beginners and intermediate users, the publication explains how to: choose an Internet provider; send and receive electronic mail; get answers from e-mail discussion groups; search the World Wide Web for practical information; and copy information from the Internet for individual use. It includes real-life examples of how farmers and marketers have used e-mail and the Web to answer questions, do research and improve their bottom line. A graphic Web sampler and other illustrations provide links to useful sites. 100 pages. Author: Mark Campidonica. Editor: Jill Shore Auburn. Price: $12.00. Order through UC DANR Communications Services.

Sustainable Farming Systems: A Guide to the Transition

Publication SA-006, 1997

Aimed at California farmers, this book on the transition to more sustainable farming systems presents ideas on subjects ranging from soil quality and pest management to farm design and the economic impacts of changing production practices. It focuses on the impact of management decisions at the farm level, and includes many references. Twelve California farmers representing a wide range of farming operations from throughout the state contributed ideas to the book in extensive interviews, and numerous other farmers, consultants, farm advisors and researchers supplied information. 84 pages. Author: Ann D. Mayse. Cost: $6.50. Order through UC SAREP.

Community Food Systems: Sustaining Farms and People in the Emerging Economy (conference proceedings)

Publication SA-005, 1997

The Community Food Systems Conference at the University of California, Davis in October 1996 was an opportunity to bring together leaders from many innovative community food system projects around the state, including SAREP-funded projects. The conference provided the occasion to articulate the role community food systems have in the midst of the global economy. The proceedings include speeches by national and local leaders who attested to the wide variety of collaborative efforts underway to build more locally based, self-reliant food economies; panel discussions and workshops about California projects; and keynote presentations which explored how these local projects relate to

the broader challenge of building healthy communities, a more vital democracy, and a civil society. 120 pages. Editors: Gail Feenstra, David Campbell, and David Chaney. Price: $10.00. Limited quantities. Order through UC SAREP.

How to Stabilize Your Farm Work Force (and Increase Profits, Productivity, and Personal Satisfaction)

Publication SA-004, 1995

This UC SAREP-funded handbook shows farmers how to diversify their operations to keep employees busy throughout the year. It brings together the strategies, benefits and challenges encountered by farmers who keep workers employed year-round. Interviews were conducted with 35 California farmers who shared some of the underlying principles that make their systems work, including crop diversification and rotation, staggered planting, saving work for off-season, labor sharing with other farmers and selective mechanization. Although no easy formula for year-round cropping systems can be given, details and charts are included for three farms from different areas of California. Written by a team of UC Cooperative Extension farm advisors and independent agricultural economists. 44 pages. Authors: Suzanne Vaupel, Gary Johnston, Franz Kegel, Gregory Billikopf, and Melissa Cadet. Cost: $6.00. Order through UC SAREP.

A Guide to Spanish Language Sustainable Agriculture Publications

Publication SA-003, 1995

This publication is a collection of English abstracts of 74 Spanish-language documents about sustainable farming practices for farmworkers and entry level farmers. The abstracts cover a wide range of topics, from the principles of sustainability to practical information about soil and water management, agricultural machinery, field safety and learning English as a second language. Each abstract includes the author of the original publication, a summary, its availability, cost, and its level of readability. Most of the publications were chosen so that individuals with primary or secondary education can read them. Farm advisors and others who work with Spanish-speaking farmers and farmworkers will be able to use these resources to do outreach and educational programs about sustainable farming practices with their clientele. SAREP has established libraries for the original Spanish documents at five strategic sites in California including the farm advisors' offices in San Diego and Fresno, at UC Santa Barbara, at the Rural Development Center in Salinas, and at the Small Farm Center at UC Davis. 90 pages. Editor: Beatriz Cabezón. Price Reduced: $5.00. Order through UC SAREP.

Community Supported Agriculture Conference

Publication SA-002, 1994

In Community Supported Agriculture (CSA) projects, consumers buy "subscriptions" to local farms, and farmers are able to plan ahead with prepaid customers. Four farmers experienced in operating CSAs discuss their farms and the history and philosophy behind Community Supported Agriculture in these proceedings from a 1993 conference at UC Davis. Includes bibliography and resource guide. 37 pages. Editor: Gerry Cohn. [OUT OF PRINT 1998]

Protecting Groundwater Quality in Citrus Production

Publication 21521, 1994

Protecting groundwater from pesticide and nitrate contamination has become one of the most pressing environmental problems in agriculture. The three main herbicides used in citrus production have been found in hundreds of wells in the San Joaquin Valley and fertilizers used in citrus production can lead to nitrate leaching. This book offers practical and economical methods for reducing the movement of agricultural chemicals to groundwater. 40 pages. Author: Chuck Ingels. Price $5.00. Order through UC DANR Communication Services.

The Dairy Debate: Consequences of Bovine Growth Hormone and Rotational Grazing Technologies

Publication SA-001, 1993

This book examines two contrasting dairy technologies: bovine growth hormone (bGH) and rotational grazing. A multidisciplinary team of researchers from across the U.S. compares the potential impacts of these technologies on cow health, consumers, farm families, the economics of dairying, the environment, and rural communities. The book raises critical issues regarding agricultural technology development, government policies, and the research agenda of land grant universities. 372 pages. Editor: William C. Liebhardt. Reduced Price: $8.00. See also our Dairy Debate stack for Macintosh computers. Order through UC DANR Communication Services.

Organic Soil Amendments and Fertilizers

Publication 21505, 1992

Organic soil amendments and fertilizers are used to enhance soil quality and promote plant growth. This publication includes a practical summary of the benefits and value of organic matter, provides some guidelines for evaluating organic materials, and describes many of the organic materials available in California. Specific materials are listed alphabetically in the index, and a glossary at the end of the publication defines important terms and concepts. 36 pages. Authors: David Chaney, Laurie Drinkwater and Stuart Pettygrove. Price: $5.00. Order through UC DANR Communication Services.

Videos

[All videos may be ordered through UC DANR Communication Services]

Creative Cover Cropping in Perennial Farming Systems

27 minutes, 1993

Cover cropping is especially useful in orchards and vineyards. Through this colorful and informative video, learn how to use cover crops to protect and improve soil fertility, enhance pest control, and provide other benefits. Producer: Robert Bugg. Reduced Price: $15.00.

Creative Cover Cropping in Annual Farming Systems

24 minutes, 1993

Cover cropping is a key tool in sustainable agriculture, but presents special challenges when used in row and field crop systems. This video depicts the opportunities and constraints in using cover crops to protect and improve soil fertility, enhance pest control, and provide other benefits. Producer: Robert Bugg. Reduced Price $15.00.

Cultural Weed Control in Vegetable Crops

18 minutes, 1993

This video examines non-chemical weed control practices used by California organic row crop growers. Weed control techniques throughout the entire growing season are covered. The video is aimed at growers interested in reducing herbicide use, but is also suitable for a general audience. Producer: Tom Lanini. Reduced Price: $15.00.

Alive and Well: Sustainable Soil Management

35 minutes, 1992

Taped on location in Northern California, this SAREP-funded introductory video on sustainable agriculture techniques features five different farming operations where sustainable practices have been successfully implemented. It communicates sound scientific principles, and demonstrates technically accurate procedures. Producers: Jan McGourty, Glenn McGourty, Oleg Harencar. Reduced Price: $20.00.

Free Publications

The following publications are available at no charge for U.S. residents (postage donation requested for foreign subscribers).

Sustainable Agriculture

This three-times per year publication from UC SAREP reports on program activities (including workshops and grants information) and issues related to sustainable agriculture. It also includes technical reviews of journal articles, workshop presentations, reports, books, and research relevant to sustainable agriculture.

What is Sustainable Agriculture?

1991

This paper identifies ideas, practices, and policies that make up the broader definition of sustainable agriculture. Animal and plant production systems and the role of consumers are addressed, and the entire food system is examined within the context of California's economic, social, and political environments. 6 pages.

Related Publications

Organic Farming Cost Studies

A number of cost studies for organically grown products are available through the Department of Agricultural and Resource Economics at UC Davis. The studies were coordinated by UC Davis Extension economist Karen Klonsky, and prepared and written by researcher Laura Tourte in collaboration with organic growers and industry representatives, UC Cooperative Extension farm advisors, and other researchers and specialists. Support for these studies has come from the National Agricultural Pesticide Impact Assessment Program of the U.S. Department of Agriculture, the Clarence E. Heller Charitable Foundation, the UC Giannini Foundation of Agricultural Economics, and UC SAREP. Each publication contains an overview of production practices (covering such topics as cover crops, crop rotation and diversification, pest management, marketing and regulations for organic production), and sample budgets for producing the crop (includes costs per acre by operation, costs per acre by inputs, monthly cash costs, investment and business overhead, profitability ranging analysis). Current titles include:

Fresh Market Organic Valencia Oranges, South Coast (1997)
Fresh Market Organic Lemons, South Coast (1997)
Organic Cotton, Northern San Joaquin Valley (1995)
Organic Apples for the Fresh Market, Central Coast (1994)
Organic Apples for the Fresh Market, North Coast (1994)
Organic Processing Tomatoes, Sacramento Valley (1994)
Organic Walnuts—Standard Spacing/Sprinkler Irrigated, Sacramento Valley (1994)
Organic Almonds—Sprinkler Irrigation, Northern San Joaquin Valley (1992)
Organic Almonds—Flood Irrigation, Northern San Joaquin Valley (1992)
Organic Wine Grapes—With Resident Vegetation, North Coast (1992)
Organic Wine Grapes—With an Annual Sown Cover Crop, North Coast (1992)
Organic Rice—No-Till Drill Seeded, Sacramento Valley (1992)
Organic Rice—Water Seeded, Sacramento Valley (1992)

Each study costs $1.00
To order contact:

Laura Tourte
Department of Agricultural and Resource Economics
University of California
One Shields Ave
Davis, CA 95616
Tel. (530) 752-9376
These publications are also available in selected University of California Cooperative Extension offices.

Cultural Practices and Sample Costs for Organic Vegetable Production on the Central Coast of California

Organic vegetable farms on the Central Coast region of California are generally intensive operations. That is, two and sometimes three crops may be harvested off the same acreage each year. Many approaches exist for growing and marketing organic vegetables. This publication describes the range of soil management practices, pest management, crop rotations, cover crops, and harvest and packing methods used by organic growers on the Central Coast of California. Marketing options and state and federal regulations governing organic commodities are also discussed. A general sequence of operations, equipment requirements, resource use, costs, yield and return ranges are presented for 13 vegetable crops and two cover crops. The vegetables included are cabbage, cauliflower, cucumbers, garlic, lettuce (leaf and romaine), onions (red and yellow), snap peas, snow peas, bell peppers (green and red), sweet corn, and winter squash (large and small varieties). Barley and vetch are the two cover crops detailed.
Giannini Foundation Series No. 94-2

To order:

This publication is currently out of print, but photocopies are available for $10.00 from the Department of Agricultural and Resource Economics, UC Davis, (530)752-2745.

To order UC DANR Communications Services products, contact:

UC DANR Communications Services
6701 San Pablo Avenue
Oakland, CA 94608-1239
Tel. (510) 642-2431 or (800) 994-8849
Prices include postage and handling. Checks payable to UC Regents.