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## Agricultural Partnerships in California

*by Jenny Broome, BIFS coordinator and Bill Liebhardt, director, UC SAREP.*

There are many ways to produce food, and a corresponding number of philosophies behind these farming methods. Over the last 10 to 15 years, producers and consumers have had a continuing dialogue regarding the use of agricultural chemicals, including fertilizers and pesticides. Consumers as well as producers have expressed human health and environmental concerns about pesticides. These concerns have been translated into both legislation, such as the recent passage of the Food Quality Protection Act (FQPA), and the marketplace where organic sales have grown annually by 20 percent for the past seven years. The question for producers appears to be, How should I change my farm operation in response to this trend? This is an important question for those who wish to maintain the economic viability of their farms for more than the short term.

Increasingly, the answer for farmers and ranchers is to work with each other and with interested regulatory, nonprofit and educational agencies. More and more farmers are organizing themselves into groups to develop and promote production systems that reduce reliance on, or the risk associated with, the use of agricultural chemicals. The shift is to the increased use of biologically based farming techniques and the integration of these practices with natural resource and wildlife conservation (see [Table 1](#) and [Table 2](#) for a list of some current projects in California). The advantages of these associations are that the participants get technical assistance, peer support, and a network of people to interact with as they make changes in their growing practices. In addition, the growers can share resources to support locally relevant research and market development. These associations help growers anticipate and comply with federal and state regulatory changes.

An early organization to support new farming systems in California was the California Certified Organic Farmers (CCOF). Since 1973, CCOF has provided technical support, materials evaluation, marketing and regulation for a growing community of organic farmers. Although there are not demonstration projects that involve only organic farmers, organic farmers play key roles in several of these projects. The fact that consumers can buy food that is certified organic provides a critical link between farmers and consumers interested in supporting this kind of farming.

Since 1993, the Community Alliance with Family Farmers (CAFF) has helped organize almond and walnut growers in several counties. The Biologically Integrated Orchards Systems (BIOS) programs include farmers, PCAs, extension advisors, nonprofit staff, and university researchers who meet as equals on their management teams. Activities include field days, grower meetings, farm visits and other functions where farmers can get information and support to make changes in their farming systems. Other

groups with this focus include the projects funded by the Biologically Integrated Farming Systems (BIFS) program administered by SAREP. BIFS has supported two, large three-year demonstration projects to date ([Table 1](#)). Approximately 650 growers in the Lodi-Woodbridge Winegrape Commission are moving toward more biologically based farming practices and are focused on improving both farming and marketing techniques. The other BIFS project is located on the West Side of Fresno County where growers are attempting to grow vegetables and cotton using soil-building and alternative pest management practices that will help them survive regulatory and environmental challenges coming in the next decade. There are similar projects with other funding sources in other grape-growing areas in the state, and in other commodities such as prunes, peaches, strawberries, cotton, tomatoes, rice and potatoes ([Table 2](#)).

The pace and priorities of all these projects are determined by individual farmer members; the important point is that each group has begun the process of changing its farming system. The projects noted here, especially early in their development, received important support from various federal, state and private agencies and foundations. In 1993, the U.S. Environmental Protection Agency's (US-EPA) Agricultural Initiative of Region IX was the first program to support BIOS and other similar pollution prevention projects in California. In 1994, California legislation was passed (AB3383) to provide funds from the state's Department of Pesticide Regulation (DPR) to support BIFS as an expansion of the BIOS model to other farming systems; additional funds for BIFS were provided by US-EPA. In 1996, DPR began its own grants program to support community-based demonstration projects to help agricultural and non-agricultural groups adopt pest management systems that reduce the human health and environmental risks associated with conventional pesticide use. Various foundations have also provided important support. The Charles Stewart Mott Foundation, Kellogg Foundation and the Pew Charitable Trust have supported BIOS, and Pew more recently has supported Sun-Maid Growers' Best Management Practices/Integrated Pest Management (BMP/IPM) Program.

Many of these partnership projects are supported by the communities themselves, either through organized assessment as with the Lodi-Woodbridge Winegrape Commission, or through grower cooperatives such as Sun-Maid Growers. As individual projects mature, there may be a handoff to a state or local agency such as a Resource Conservation District. Finally, the marketplace may link consumers to growers via associations such as CCOF or other recent "eco-labeling" initiatives.

However advanced a biologically integrated farming system may be, there are always unmet research needs. There are a growing number of researchers getting involved in "piggyback" research projects linked to these partnerships. The impact of this kind of collaborative and participatory research can be substantial if growers help set the research agenda and then support it. If the work is carried out on their farms, they are ready and willing to implement the practices and help extend them throughout their community.

More of these kinds of partnerships are forming in California, but the challenges are substantial. The BIFS program provides funding to help industries surmount the challenges with biologically integrated farming systems aimed at reducing reliance on and risks associated with agricultural

chemicals. With the passage of FQPA, certain pesticides may no longer be registered. In the next three years US-EPA will be reviewing tolerances for all organophosphates, carbamates and the EPA category B2 carcinogens. Some registrants will decide the revenues to be gained are not worth the expense of generating the new data required. Management of some pests is becoming increasingly difficult due to the development of resistance to specific pesticides. Groundwater contamination from nitrates is extensive and has most recently been associated with dairy operations in the Central Valley; new regulations are sure to follow. There are increased expectations from consumers that farming can and should integrate resource conservation practices and provide a healthy and creative work environment. The projects listed are addressing these challenges in concrete ways.

Interested growers can become involved with a project in their area or organize a new one. Agricultural consultants and suppliers can expand their services and supplies to support these new systems. Grower associations can help connect members with each other and with state and federal agencies interested in supporting these kinds of projects. Processors and handlers can support these projects through the standards they set. Regulatory agencies can enter into the partnerships and work with these kinds of voluntary programs. University researchers can evaluate the side-by-side demonstration plots of a conventional and a biologically integrated farming system so as to elucidate mechanisms and increase understanding of the system. In addition, researchers can help expand the impact of the projects through investigating missing components of the systems. And, finally, consumers can use the marketplace to support such projects. [Note: The UC SAREP BIFS program is expecting to support more projects in the coming years. For more information on the program please contact new SAREP staff member Jenny Broome at (916) 754-8547.]

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## Joint 1998 Ag, Food & Human Values Conference in California

The joint annual meeting of the Agriculture, Food and Human Values Society and the Association for the Study of Food and Society will bring together two multidisciplinary professional and scholarly societies in San Francisco, Calif. June 4-7, 1998. The groups will discuss contemporary issues relating to food, dietary and nutritional behaviors; food and agricultural practices; ethical and values issues in food and agriculture; public policies toward food and agriculture; and the history, philosophy, social institutions and values that underlie them. Papers, posters and panels are sought on any topic relating to agriculture, food and society (deadline March 1, 1998). For more information on submitting abstracts, panels and posters contact Jacqueline Newman, Queens College, CUNY, Dept. of Family Nutrition and Exercise Science, 6530 Kissena Blvd., Queens, NY 11367; tel: (718) 997-4150; fax: (718) 997-4163; email: [newman@qcvaxa.acc.qc.edu](mailto:newman@qcvaxa.acc.qc.edu)

## Project Update

# The Market Basket Program: A Strategy to Strengthen Community Food Security

by Michelle Mascarenhas

*[Editor's Note: This paper contains excerpts from the report "Community Food Systems For All: Learning from the Market Basket Program" by Robert Gottlieb and Michelle Mascarenhas. For a full copy of the report contact the Pollution Prevention Education and Research Center at (213) 259-2566 or e-mail [mm@oxy.edu](mailto:mm@oxy.edu)]*

On a recent Wednesday afternoon at the West Vernon Elementary School, Maria Esparza, Delia Ramirez and Paulina Flores marveled at the small, fresh nopales (cactus leaves) which farmers Maria and Joel Espino had carefully picked just a few hours earlier at their farm in Ontario, Calif. "When they are small and new," Ramirez and Flores explained, "they are much more tender than those in the supermarket." These community members from a neighborhood in South Central Los Angeles are strengthening their food security through a pilot project called the Market Basket.

Market Basket is a project of the Southland Farmers' Market Association and the Community Food Security Project of the Pollution Prevention Education and Research Center which seeks to 1) increase revenues for farmers who sell at farmers' markets without increasing their transport or time-related expenses; 2) increase access to fresh produce in low-income communities where access is limited; 3) provide access to farmers' market produce to people of all income levels who cannot shop or have difficulty shopping at the farmers' market; and 4) to encourage farmers to reduce their pesticide use as well as try different production and post-harvest handling methods.

The program was launched with funding from UC SAREP in 1995 and 1996. Since then, additional funds have been provided by Region IX of the US-EPA, California Community Foundation, Food for All, and the California Endowment.

As initially designed, the program was structured in the following ways:

**Step 1:** Households and organizations would sign up to purchase a basket of farm-fresh fruits and vegetables at least one week in advance (and more likely, one to three months in advance) of the Saturday pick-up date. Participants would purchase the basket at one of three prices, depending on the subscriber's ability to pay.

The growers participating in the program would then agree in advance of the

Saturday Gardena Farmers' Market to sell a portion of their harvest to the Market Basket program, at a price 15 percent below farmers' market prices, with the amount of produce to be sold determined by the number of subscribers for the week.

**Step 2:** Each week, the growers and the Market Basket coordinator would decide, based on crop quality, quantity, and the need for diversity and variety in the basket, which produce should be included in the baskets. By combining the harvests of several farmers from different (though nearby) growing regions, it was assumed that the Market Basket would be able to offer a wide variety of locally grown, seasonal produce to participants.

**Step 3:** The produce, purchased in bulk, would then be assembled into "shares" and distributed at drop-off points, such as community centers or child-care centers, where they could be picked up by participant subscribers.

By the first anniversary of the Market Basket Program, several strengths and weaknesses of the project could be identified and its capacity to serve as a new model for direct marketing could be assessed. The program's strengths included its providing additional revenues for farmers and increased support for the farmers' market overall; possible incentives for reduced pesticide use and other changing practices; greater access and opportunities for the purchase of high quality, fresh produce by low-income residents; and new kinds of community food partnerships that also had the potential to enormously enhance opportunities for direct marketing.

Program weaknesses included erratic subscriber patterns; modest participation levels on a weekly basis; the need to strengthen access through more drop-off points and/or a delivery service; difficulties in attracting and/or maintaining subscribers who have been participating in existing food assistance or free food programs; and the need to strengthen the program's ability to attract middle- and upper-income participants to help generate revenue to support low-income participation as well as program costs. As it now stands, the future viability and expansion of the Market Basket program will depend on program organizers' ability to incorporate the lessons learned, in part by extending the project to new sites and by exploring other opportunities for direct marketing development.

### **Future Directions**

Based on the analysis of the Market Basket program's first year of operation, project organizers have established a series of new goals and directions. These include:

- Establishing opportunities for greater access and increased participation by linking a Market Basket program to a weekday farmers' market in order to establish drop-sites at schools, child care centers, WIC clinics, workplaces, and other community or institutional settings.
- Developing additional Market Basket sites in middle and upper-income communities in order to provide a stable funding source for program operations and subsidies for low-income households.
- Identifying methods to increase subscriber choice, meet the need for culturally acceptable food, and enhance the community- building nature of the program.

Increasing community participation in the development and revision of the program.

Other Direct Marketing-Related Strategies:

- Investigating the potential of developing a farmers' market transport/Market Basket delivery program.
- Exploring the potential for new kinds of institutional partnerships in direct marketing, such as a pilot Farmers' Market Salad Bar at a predominantly low-income elementary school.

While the Market Basket program needs to develop further before it can be identified as a model for other areas, information about the limits and opportunities for expansion of this exploratory direct marketing program still provide crucial signposts for the development of a community and farmer-based food system. The first year of the Market Basket offers important though cautionary lessons in that development.

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## Plant Pathologist Joins UC SAREP Staff

UC SAREP welcomes new staff member Jenny Broome, who will be dividing her time between coordinating the Biologically Integrated Farming Systems (BIFS) program, and developing and extending sustainable pest management practices and systems. In her capacity as BIFS coordinator, Broome will be collaborating with individuals and organizations in California's agricultural industry interested in developing and demonstrating more biologically based farming systems. As a plant pathologist, Broome hopes to integrate the use of weather data as well as cultural and biological control methods for disease management into some of the biologically integrated farming systems taking shape in California.

Broome comes to SAREP from the California Environmental Protection Agency's Department of Pesticide Regulation (DPR), where she was a research scientist in the Environmental Monitoring and Pest Management Branch. She developed and extended models that aid in pest management decision making, and analyzed DPR's pesticide use database for trends and patterns in pesticide use in California agriculture. While at DPR, Broome developed a \$600,000 per year competitive grants program to encourage the use and demonstration of environmentally sound pest management systems.

She will continue to direct the development of the disease model database of the PestCast project, a statewide weather monitoring network for use in plant disease model validation and implementation. PestCast is coordinated by the University of California Statewide Integrated Pest Management Project and is funded by the Environmental Technology Initiative of the U.S. Environmental Protection Agency as well as DPR, UC and the agricultural industry in California.

Broome received her doctoral and master of science degrees in plant pathology from the University of California, Davis, and her bachelor of science degree in biological sciences from Swarthmore College.

## Soil Solarization: An Alternative Soil Disinfestation Strategy Comes of Age

James Stapleton

UC Plant Protection Quarterly, 7(3):1-5

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*Editor's Note: The following is excerpted from an article that appeared in the July 1997 issue of the UC Plant Protection Quarterly, a publication of the University of California Kearney Plant Protection Group and Statewide IPM Project. For the full text of the article, or for more information about soil solarization contact the author at the UC Kearney Agricultural Center, 9240 S. Riverbend Ave., Parlier, CA 93648, Tel. (209) 646-6015.*

Solarization is a natural, hydrothermal soil disinfestation process which is accomplished through passive capture of solar radiation in moist soil. Soil solarization occurs through a combined physical, chemical, and biological mode of action, and is compatible with other disinfestation materials, such as organic amendments, biological control organisms, or pesticides. It is currently used on a relatively small scale worldwide as a substitute for synthetic chemical toxicants. The use of solarization is expected to increase as methyl bromide is phased out. Solarization, as any other soil disinfestation method, has both benefits and limitations. It is simple, safe, effective within its use limitations, and can be readily combined with biological and chemical control measures. On the other hand, solarization is dependent upon local meteorological conditions, is most effective near the soil surface, does not consistently control certain heat-tolerant pathogens such as *Macrophomina phaseolina* and *Meloidogyne* spp., should be done during the hottest part of the year, and requires disposal of plastic film.

The practical value of soil solarization, as of any pest management strategy, must be assessed by several factors, including pesticidal efficacy, effect on crop growth and yield, economic cost/benefit, and user acceptance (Stapleton, 1995; Stapleton and DeVay, 1995). Its routine use as a viable alternative to chemical fumigants in several areas of the world indicates that solarization has already achieved limited user acceptance. There is now a substantial body of literature describing organisms which are controlled or partially controlled by solarization, including in excess of 40 fungal plant pathogens, more than 25 species of nematodes, numerous weeds, and a few bacterial pathogens (Katan, 1987; Stapleton and DeVay, 1995; Stapleton, 1996; Elmore et al., 1997). In addition to the major pathogens that are reduced by solarization, a number of minor pathogens also are reduced. This is one of the reasons that an "increased growth response" (IGR) is often observed after solarization, similar to that commonly found after chemical fumigation. Solarization has been frequently documented to stimulate IGR in plants even when no major

pathogens can be isolated, and reductions in the overall number of soil microorganisms have been significantly correlated with increased plant growth following treatment (Katan, 1987; Chen et al., 1991; Stapleton and DeVay, 1995).

### **Current Use**

The principal use of solarization, on a total acreage basis, is probably in conjunction with greenhouse grown crops. Another application for which solarization has come into common use, particularly in developing countries, is for disinfestation of seedbeds, containerized planting media, and cold-frames (Stapleton and Ferguson, 1996). As with use in greenhouses, these are natural niches for solarization, since individual areas to be treated are small, soil temperature can be greatly increased, the cost of application is low, the value of the plants produced is high, and the production of disease-free planting stock is critical for producing healthy crops. Solarization of containerized soil can be accomplished in less than a week during periods of hot weather. For example, moist soil in black polyethylene nursery sleeves covered by a single layer of clear plastic film reached 69°C, and in sleeves covered by a double plastic layer temperatures reached 72°C in the San Joaquin Valley of California (Stapleton and Ferguson, 1996). These temperatures are lethal to most soilborne pests within hours, and approach the heat levels produced during soil disinfestation using aerated steam.

On a global scale, solarization for disinfesting soil in open fields is being implemented at a relatively slow but increasing rate. It has been used commercially in areas such as the central and southern desert valleys of California and Israel where air temperatures are very high during the summer and much of the cropland is out of production at this time due to excessive heat (Bell and Laemmlen, 1991; Becker and Wrona, 1995; Grinstein and Ausher, 1991). This system is also a natural window of advantage for using solarization, since the summer fallow provides a time period of several weeks for rotating into solarization. Most growers in California who are now using solarization in production fields are those that have some aversion to the use of methyl bromide or other chemical soil disinfestants, either because of their close proximity to urban or residential areas, personal preference, or because they are growing for organic markets.

Most transparent polyethylene films are suitable for conducting solarization. However, use of lower quality films may be problematic since the plastic may break down prematurely, leaving a myriad of fragments which are difficult to dispose of. Higher quality film more resistant to degradation by ultraviolet light is worth the extra price. The thickness (gauge) of the film is relatively unimportant, except for cost; film strength does not directly correlate with thickness. Plastic is priced based on the cost of petroleum, so thicker plastic weighs more and costs more than thinner film. Certain plastics manufacturers produce films specially designed for solarization. Most farm supply outlets and many nurseries stock or can order suitable films.

The cost-benefit ratio of solarization compared to other soil disinfestation practices must be calculated on a case-by-case basis. Few economic analyses have been done to compare solarization with conventional disinfestation practices (Elmore, 1991; Yaron et al., 1991). As a rough estimate, the cost of solarization, including film, application, and removal, is one-third to one-half

that of tarped, methyl bromide fumigation (\$400-600 per treated acre vs. \$1,100). The yield, quality, and value of the following crops will determine the relative benefit of the soil disinfestation treatments. In organic production without the use of chemical disinfestants, crop yield and quality are often lower than in conventional production, but the unit value of produce is often higher. In this case, only small increases in yield following solarization are needed to pay for the treatment, and large increases in yield often occur (Elmore, 1991).

### **How Can Solarization be Improved?**

With both benefits and limitations considered, solarization is an effective soil disinfestant in numerous geographic areas for certain agricultural and horticultural applications. Nevertheless, there are many situations where it may be desirable to increase the efficacy and/or predictability of solarization through combination with other methods of soil disinfestation. Since solarization is a passive process with biocidal activity dependent to a great extent upon local climate and weather, there are occasions when even during optimal periods of the year, local atmospheric conditions (i.e., cool air temperatures, extensive cloud cover, frequent or persistent precipitation events) may not permit effective solarization. This uncertainty must be overcome if widespread implementation of solarization is to occur, since commercial users cannot tolerate soil disinfestation treatments which are not consistently effective. Integration of solarization with other disinfestation methods may be essential in order to increase treatment predictability, and thus, commercial acceptability (Stapleton, 1995).

Previous studies have shown that solarization may be productively combined with other chemical and biological control methods (Katan, 1987; Chellemi et al., 1994; Stapleton and DeVay, 1995; Tjamos and Fravel, 1995). Recently, considerable interest has been generated regarding the use of organic amendments in combination with solarization to achieve biofumigation (Gamliel and Stapleton, 1993a, b). A wide range of organic amendments, including plant residues, by themselves have some degree of soil disinfestation activity. Addition of biocidal soil amendments or crop residues as part of a crop rotation scheme may in certain cases be useful for managing population levels of soilborne pests. However, for routine use in high value, intensively-farmed horticultural crops, it is unlikely that periodic rotations into bioactive plants alone will provide sufficient efficacy, predictability, or economic return to be of consistent value. Combining a variety of soil amendments with solarization to accomplish biofumigation is an improved option.

One promising combination of organic amendments with solarization involves residues of cruciferous plants, which release a number of biotoxic volatile compounds into soil during the decomposition process (Ramirez-Villapudua and Munnecke, 1987). Production and release of these compounds was demonstrated to be greatly increased, both qualitatively and quantitatively, when cabbage (*Brassica campestris* var. *capitata*) amendment was combined with soil heating. The aldehydes and isothiocyanates produced by the decomposing cabbage were positively correlated with fungicidal activity in treated soil (Gamliel and Stapleton, 1993a). Release of these compounds was a function of the decomposition process. Various products and intermediaries were produced and dissipated in a chemical cascade. In

conjunction with soil heating, the formation and release of these biotoxic volatile compounds occurred mainly during the first three weeks of solarization. After that time, concentrations of most compounds dropped to low or undetectable levels.

Feasible alternatives to chemical soil fumigants must provide effective, predictable, economical, and relatively rapid reductions of pest and disease organisms. Solarization has limitations which prevent it from universally replacing fumigants. However, in suitable climates and for compatible applications, solarization alone, or in combination with other agents, is ready for implementation.

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(DEC. 549) *Contributed by James Stapleton*

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# Searching for the O-Word

Mark Lipson

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*Editor's Note: The following article is adapted from the Executive Summary of the report Searching for the O-Word, published by the Organic Farming Research Foundation. The full report is available from OFRF, Tel. (408) 426-6606, for a requested donation of \$15.*

## Overview

U.S. sales of organic foods exceeded \$3.5 billion in 1996. The organic foods sector has grown at an average rate of 20 percent annually for the last seven years. Over 10,000 U.S. farms are engaged in profitable, agronomically successful commercial production without reliance on synthetic fertilizers and pesticides. Organic farming encompasses every region of the country and every crop grown in the U.S.

Despite this positive record, the potential of organic farming remains largely undeveloped. Research and development support for organic farming systems is needed to fulfill the promise of highly productive, non-toxic, ecologically sound agriculture. To assess the state of organic farming research, the Organic Farming Research Foundation initiated the National Organic Research Policy Analysis project (NORPA). During 1995 and 1996 the NORPA project conducted a study to identify and catalogue federally supported agriculture research that pertains specifically to the understanding and improvement of organic farming. In addition, the study contains a brief history of organic research policy and policy recommendations to USDA.

## Methodology

The study used the Current Research Information System (CRIS) database, which contains about 30,000 summaries of research projects supported by USDA. There is not a specific "organic" classification within the CRIS system, so an indirect search strategy was developed. An initial screening of the CRIS database was performed using 71 keywords related to organic farming systems. This process returned a pool of approximately 4,500 distinct project summaries. A rating scheme for evaluating "organic-pertinence" was developed based on research topics, as well as the project's experimental context. Each of the 4,500 projects was reviewed and rated for organic-pertinence. Aggregate FY1995 funding data for organic-pertinent projects was compiled by USDA staff and forwarded to OFRF.

## Results

The results of the CRIS search found only 34 projects rated as "strong organic," meaning that the project was explicitly focused on organic systems or methods, and described an experimental setting consistent with conditions found on working organic farms. These projects represent less than one-tenth of one percent of USDA's research portfolio, both numerically and fiscally. An additional 267 projects were rated as "weak organic," meaning that the research topic was compatible with organic methods, but not explicitly placed in the context of organic agriculture. The "strong organic" projects with FY1995 funding received a total of \$1.5 million in federal funding, although even this small amount overstates the actual support of organic-pertinent activities. *[Editor's Note: In the full report the authors state that in FY 1995, one single project (out of 15 total) accounted for 81 percent of the funding that went to the "strong organic" projects; the remaining 14 received a total of \$280,000. Also, as discussed in the full report, most projects funded by the USDA-Sustainable Agriculture Research and Education (SARE) program do not appear on the CRIS database. The author estimates that a full review of current SARE projects would add 30 to 50 organic-pertinent projects to the list.]*

### **Conclusions**

While some organic-pertinent research does exist, these projects mostly are unrelated to any coherent strategy or analysis of organic farmers' needs. Organic farming systems represent a vital scientific frontier in the development of environmentally sound agriculture. The growth of the organic production sector is also an important economic opportunity and an element of sustainable rural development. The national agricultural research system has failed to recognize this potential, let alone explore it seriously or help improve the performance of organic farming systems. This failure is contradictory in light of policy goals seeking reduced environmental risks in agriculture (e.g., The President's IPM Initiative), greater diversity in cropping patterns (e.g., "Freedom to Farm" legislation), and the incorporation of "sustainability" as a guiding policy principle.

### **Recommendations**

1. USDA should issue a basic policy statement recognizing that organic farming can play a significant role in meeting the nation's agriculture, environmental, and economic development needs.
2. Collection and dissemination of information about organic agriculture should be a routine and expected task for all relevant USDA agencies.
3. Current efforts to improve the CRIS system should incorporate a definition of organic-pertinence and integrate it into the reporting system.
4. Implementation of USDA national initiatives (e.g., Fund for Rural America, National Research Initiative, Integrated Pest Management, Food Safety, etc.) should support and utilize organic farming research and education.
5. Specific research and development support should be allocated for the implementation of the National Organic Program.
6. USDA should undertake a national initiative for organic farming research,

including;

- Assessment by all USDA research and education agencies of the potential contributions of organic farming to their Missions and Goals.
- Facilitating the development of scientific goals for organic farming research, bringing together producers and scientists to construct a long-term scientific agenda.
- Funding for multidisciplinary investigations emphasizing on-farm organic systems analysis, combining research and extension.
- Establishing a national network of dedicated organic experiment stations, guided by local organic farmers.

For more information: Mark Lipson, Organic Farming Research Foundation,  
PO Box 440, Santa Cruz, CA 95061

*.(DEC.548) Contributed by Mark Lipson*

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## Sustainable Agriculture Graduate Awards Yield Results

In 1992, SAREP began providing small grants on a competitive basis to graduate students doing research in sustainable agriculture. Many of these students have completed their research and moved on to meaningful careers in agriculture and natural resources management. The following is a list of theses and dissertations that have been completed by students receiving these awards. The titles indicate the variety of projects and areas of discovery that the graduate awards have supported.

### *1992 Awards*

**Jeff Dlott.** 1993. Participatory Research in Sustainable Agriculture: Peach Twig Borer, *Anarsia lineatella* Zeller, Biology and Natural Biological Control by *Formica aerata* in California Peach Agroecosystems. University of California, Berkeley.

**Niklaus Grunwald.** 1997. Characterization of Soil Nutrient and Microbial Variables associated with *Pythium aphanidermatum* and *Rhizoctonia solani* Growth and Tomato Damping-off during Short-term Cover Crop Decomposition. University of California, Davis.

**Nirmala Gunapala.** 1994. Soil Microbial Dynamics and Nitrogen Availability in Organic, Low-Input and Conventional Cropping Systems. University of California, Davis.

**Jeff Mitchell.** 1995. A Cropping Systems Approach to Improving Water Use Efficiency in Semi-Arid Irrigated Production Areas. University of California, Davis.

**Hilary Sampson.** 1996. Spatial and Temporal Patterns of Extractable Nitrogen in the Surface Soil of Three California Almond Orchard Systems. University of California, Davis.

**Eric Tedford.** 1994. Transmission of the Nematophagous Fungus *Hirstulla rhossiliensis* in Soil. University of California, Davis.

**Robert Venette.** 1997. Assessment of the Colonization Potential of Introduced Species During Biological Invasions. University of California, Davis.

**Fekede Workneh.** 1993. Comparison of Severity of Corky Root (*Pyrenochaeta lycopersici*) and Phytophthora Root Rot (*Phytophthora parasitica*) on Tomato and Associated Soil and Plant Variables on Organic and Conventional Farms. University of California, Davis.

### ***1994 Awards***

**George Heimpel.** 1995. Host Feeding Strategies of Aphytis Parasitoids. University of California, Davis.

**Jennifer Katcher.** 1996. Effects of Nitrogen Fertilization, Irrigation Cultivar and Maturity on Mechanisms of Almond Hull Rot Resistance. University of California, Davis.

**Heinrich Schweizer.** 1996. Mortality of Citrus Thrips, *Scirtothrips citri* (Moulton) on Ground Factors Affecting the Degree of Fruit Scarring. University of California, Riverside.

**Laura Tourte.** 1996. The Effects Of Kelp (Seaweed) Extract and Fish Powder Sprays on Organically Grown Processing Tomatoes: Plant Growth, Yield and Economics. University of California, Davis.

### ***1995 Awards***

**Davis Smethurst.** 1997. Transforming the High Country: Absentee Ownership and Environmental Change in the Central Sierra. University of California, Berkeley

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### 3 New SAREP Publications: Internet Book, Community Food Systems Proceedings, Transition Book

UC SAREP is proud to announce three new publications, *How to Find Agricultural Information on the Internet*, the proceedings for the SAREP-sponsored October 1996 Community Food Systems Conference at UC Davis, and *Sustainable Farming Systems: A Guide to the Transition*. Here are the details:

- *How to Find Agricultural Information on the Internet*, by **Mark Campidonica**, edited by **Jill Shore Auburn**, UC SAREP, published by UC Division of Agriculture and Natural Resources Communication Services, Publication No. 3387, 100 pages, 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 email 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 email 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. To order, send a check payable to "UC Regents" for \$12 plus \$3 shipping and handling (in California add \$0.99 sales tax) to UC DANR Communication Services, 6701 San Pablo Ave., Oakland, CA 94608-1239. Orders may also be placed by telephone with VISA or MasterCard or a purchase order: Tel: (800) 994-8849 or (510) 642-22431; fax: (510) 643-5470; email: [danrcs@ucdavis.edu](mailto:danrcs@ucdavis.edu); Web site: <http://danrcs.ucdavis.edu>
- *Community Food Systems: Sustaining Farms and People in the Emerging Economy*, conference proceedings, edited by **Gail Feenstra**, UC SAREP, and **David Campbell**, UC Davis California Communities Program and **David Chaney**, UC SAREP, 120 pages, 1997. The Community Food Systems Conference at the University of California, Davis in October 1996 was an opportunity to bring together leaders from 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 speakers who discussed 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 discussed how these local projects

relate to the broader challenge of building healthy communities, a more vital democracy, and a civil society. To order the proceedings, send a U.S. check or money order payable to "UC Regents" for \$10 (California residents add \$0.73 tax) to UC SAREP, University of California, One Shields Ave., Davis, CA 95616-8716; Tel: (530) 752-7556 (mark "CFS Proceedings" on the check).

- *Sustainable Farming Systems: A Guide to the Transition*, by **Ann D. Mayse**, UC SAREP, 84 pages, 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. To order the book, send a U.S. check or money order payable to "UC Regents" for \$6.50 (California residents add \$0.47 tax) to UC SAREP, University of California, One Shields Ave., Davis, CA 95616-8716; Tel: (530) 752-7556 (mark "Transition Publication" on the check).

## **Resources**

### **Sharing Equity**

*This Land Shall be Forever Stewarded: A Story of a Community's Effort to Preserve the Farm Through Sharing Property Equity*, by **Jered Lawson**, photos by **Nancy Warner**, published by the Community Alliance with Family Farmers (CAFF), 30 pages, 1997. This manual describes how one family farm was saved through shared land equity. Live Power Community Farm in Covelo, Mendocino County, Calif. was preserved for farming by a group of people who wanted to create a model for conserving and protecting agricultural land. Specific issues the group addressed in its efforts were the preservation of farmland from conversion to non-agricultural development and housing uses; the promotion of biological/sustainable farming practices that would enhance biological life and the integrity of agricultural soils; and the elimination of the speculative value of farmland so that it becomes and remains affordable for farming. The documentation of this process was funded by a 1994 UC SAREP grant. The manual is intended to be a tool of empowerment and an introduction to shared-equity, with particular emphasis on the elements developed by the people of the Live Power Community Farm. Specifics such as where to find a nonprofit partner, how to raise funds, and drafting an Easement or Option are covered in practical "how to" instructions. It is a handbook for farmers, landowners and investors who are concerned with the future of family farms and the promotion of farming methods that will sustain the integrity and productivity of the land. To obtain a copy of the \$10 manual, contact CAFF at PO Box 363, Davis, CA 95617; Tel: (530) 756-8518; email: [caff@caff.org](mailto:caff@caff.org); Web site: <http://www.caff.org>

### **Farm-City Border Issues**

*California's Future: Maintaining Viable Agriculture at the Urban Edge*, University of California Agricultural Issues Center, UC Davis, 80 pages, 1997. A new UC report offers information that could help the nation's largest urban population and a world-class agricultural system peacefully coexist in the state of California. The report focuses on technologies and public policies that allow farmers to continue growing crops with minimal impact on their urban neighbors. The publication is the summarized proceedings of a day-long conference held Dec. 4, 1996 in Sacramento. It includes the recommendations of land use planners, researchers, farmers, government officials and others concerned about problems on both sides of the farm-city interface, including UC Davis Chancellor **Larry N. Vanderhoef**. The usefulness of statewide regulations is discussed by **Steve Sanders**, chief of staff to Assemblyman **Michael Sweeney**. **Jack E. Pandol, Jr.**, a farmer and former undersecretary at Cal-EPA (and former UC SAREP Public Advisory Committee member), suggests developing economic incentives. New technologies in agricultural production that minimize the nuisance of farming to urban neighbors are outlined by UC scientists. Other speakers consider buffers, planning design and parcel sizes in solving the problem. UC

Extension Public Policy Specialist **Alvin D. Sokolow** of UCD suggests that establishing a stable farm-city edge offers the best hope for compatible long-term coexistence. To order the \$15 publication, contact the Agricultural Issues Center, University of California, One Shields Ave., Davis, CA 95616, or call (530) 752-2320.

## **Central Valley Farmland**

*Municipal Density and Farmland Protection: An Exploratory Study of Central Valley Patterns*, by **Alvin D. Sokolow**, University of California Agricultural Issues Center, UC Davis, 55 pages, 1996. The third research report in the California Farmland and Open Space Policy Series, this publication focuses on the policies and actions of city governments. To order the \$12 publication, contact the Agricultural Issues Center, University of California, One Shields Ave., Davis, CA 95616, or call (530) 752-2320.

## **USDA Small Farm Publication**

*Small Farm Digest*, a new free quarterly newsletter from the USDA Cooperative State Research Education and Extension Service (CSREES). The Digest constitutes a merger of the former *Small Scale Agriculture Today and Small and Part Time Farms*. The audience is administrators of colleges of agriculture of land-grant universities; directors of state agricultural experiment stations; Extension agents; and small- and part-time farmers, as well as farm-related businesses; ranchers; commodity groups; community-based organizations; philanthropic foundations; and the general public. The establishment of the new periodical reflects that the former USDA Office for Small Scale Agriculture has merged with the USDA Small Farm Program within CSREES. Digest editors welcome information for potential articles and notices of events. To subscribe or submit information, contact **Denis Ebodaghe**, USDA-CSREES, STOP 2220, Washington, D.C. 20250-2220; **Stephanie Olson** at 202/401-6544 (telephone); 202/401-1602 (fax); or email: [solson@reeusda.gov](mailto:solson@reeusda.gov) To subscribe to an electronic version of the publication, send a message to: [majordomo@reeusda.gov](mailto:majordomo@reeusda.gov) In the body, type: subscribe smallfarm-mg The Web site is located at: <http://www.reeusda.gov/smalfarm>

## **Saltcedar & Riparian Proceedings**

*Saltcedar Management and Riparian Restoration Workshop*, proceedings from September 1996 Las Vegas, Nev. conference sponsored by the U.S. Fish and Wildlife Service, Refuges/Wildlife, Portland, Ore. is available via the World Wide Web at:

<http://refuges.fws.gov/NWRSFiles/SaltcedarWorkshopSep96/wkshpTC.html>

## **Sustainable Ag Source Book**

*Source Book of Sustainable Agriculture*, published by the Sustainable Agriculture Network (SAN), 136 pages, 1997. SAN's new book is organized by state and lists 559 resource materials on agriculture, from how to market sustainably grown vegetables to locating the latest sustainable research findings on the World wide Web. It covers print, electronic and video resources and includes contact information. To order, send a check or purchase order for \$12 to Sustainable Agriculture Publications, Hills Building,

UVM, Burlington, VT 05405-0082. For information on bulk discounts or rush orders, call (802) 656-0471 or email [msimpson@zoo.uvm.edu](mailto:msimpson@zoo.uvm.edu)

## Organic Directory

*1997 National Organic Directory*, Community Alliance with Family Farmers (CAFF), 400 pages. The directory includes cross-referenced indexes of commodities, telephone and fax numbers, email and Website addresses, contact names of organic growers, wholesalers, farm suppliers and related businesses and their regions of operations. It has indexes of services, exporters/importers, certification groups, mail order, CSAs, farm acreage, organic farm supplies, and includes fully updated summaries of state and federal organic laws. The cost is \$44.95 plus \$3 handling and \$3.48 sales tax in California. To order a copy contact CAFF at PO Box 363, Davis, CA 95617; Tel: (530) 756-8518; e-mail: [caff@caff.org](mailto:caff@caff.org); Web site: <http://www.caff.org>

## Pesticide Studies

*The Myths and Realities of Pesticide Reduction: A Reader's Guide to Understanding the Full Economic Impacts*, by **Edward Jaenicke**, the Henry A. Wallace Institute for Alternative Agriculture, 35 pages, 1997. This report helps readers understand the economic predictions in studies about restricting the use of, or reducing the risks from, agricultural pesticides. The publication is priced at \$6; to order, contact the Wallace Institute, 9200 Edmonston Rd., #117, Greenbelt, MD 20770; Tel: (301) 441-8777; email: [hawiaa@access.digex.net](mailto:hawiaa@access.digex.net); Web site: <http://www.hawiaa.org/>

## Regulated Pest Management Districts

*Organic Growers in Regulated Pest Management Districts: A Guide to Changing the Rules*, Northwest Coalition for Alternatives to Pesticides (NCAP), 18 pages, 1997. This step-by-step guide on how to effect change in regulated pest management districts is aimed at individuals and farmers who want to change rules that dictate repeated applications of agricultural pesticides. \$3 to cover postage/handling. Contact: **Norma Grier** at NCAP, PO Box 1393, Eugene, OR 97440; Tel: (541) 344-5044; email: [ncap@ipc.apc.org](mailto:ncap@ipc.apc.org) Web site: <http://www.efn.org/~ncap/>

## WEB SITES

### AgriSurf!

<http://www.agrisurf.com>

AgriSurf! has links to hundreds of agricultural sites on the Internet, including 60 listed under "Sustainable Agriculture."

### Watersheds

#### State Watershed Sites:

California: <http://ice.ucdavis.edu>

Illinois: <http://www.epa.state.il.us/org/bow/targeted-watershed>

Kentucky: <http://www.state.ky.us/agencies/nrepc/dow/watrshd.htm>

Pennsylvania:

<http://www.dep.state.pa.us/dep/deputate/enved/watershed/watershed.htm>

Vermont: <http://www.anr.state.vt.us/water1.htm>

Virginia: <http://www.deq.state.va.us/envprog/watqual.html>

Wisconsin: <http://www.doa.state.wi.us/deir/coastal.htm>

### **National Watershed Sites:**

CTIC Know Your Watershed: <http://www.ctic.purdue.edu>

USGS Real-Time/Watershed Info (by state):

<http://water.usgs.gov/public/wrd002.html>

USGS National Water Quality Assessment (NAWQA):

[http://www.rvares.er.usgs.gov/nawqa/nawqa\\_home.html](http://www.rvares.er.usgs.gov/nawqa/nawqa_home.html)

US EPA OWOW Surf Your Watershed: <http://www.epa.gov/surf/>

GWPC Groundwater Quality: <http://www.site.net/>

Institute for Agriculture and Trade Policy: <http://www.iatp.org/home.htm>

**SAREP WEB Information:** <http://www.sarep.ucdavis.edu>

In addition to its print publications, UC SAREP offers access to SAREP-funded research and education projects, its newsletter, its latest Progress Report, an interactive calendar, and information databases through its World Wide Web server.

## Sources of Funding

### USDA-SARE Western Region RFPs Reminder; Producer Call Set

Calls for proposals were released in July for the U.S. Department of Agriculture's Western Region Sustainable Agriculture Research and Education (SARE) program. A call for research and development projects directed by area farmers and ranchers is set for release the first week of November 1997.

- The competitive research grants portion of SARE and the Agriculture in Concert with the Environment (ACE proposals) are due **October 29, 1997** (by 5:00 p.m. Mountain Standard Time).
- SARE's professional development grant proposals are due **November 19, 1997** (by 5:00 p.m. Pacific Time). This effort supports grants to help Cooperative Extension Service, Natural Resources Conservation Service and other professionals expand their understanding of sustainable agriculture.
- Farmers and ranchers residing in the Western U.S. can compete for grants to identify, evaluate and test sustainable agriculture practices and challenges through Western SARE's farmer/rancher research grant program. Individuals can apply for up to \$5,000; producer groups, three or more farm/ranch operations working cooperatively, can apply for up to \$10,000 per group. A call for proposals will be released the first week of November 1997. The deadline for proposals will be **January 15, 1998**.

To get on the mailing list for calls for proposals, contact the Western SARE office at Utah State University at (801) 797-2257; [fnhinck@cc.usu.edu](mailto:fnhinck@cc.usu.edu). Calls for proposals can also be down-loaded from the program's Web site at: <http://ext.usu.edu:80/wsare/>

For general information, contact Kristen Kelleher, communications specialist, at (530) 752-5987; [kkelleher@ucdavis.edu](mailto:kkelleher@ucdavis.edu). The Western Region includes Alaska, American Samoa, Arizona, California, Colorado, Guam, Hawaii, Idaho, Micronesia, Montana, Nevada, New Mexico, N. Mariana Islands, Oregon, Utah, Washington and Wyoming.

### Pest Management Funds

The California Department of Pesticide Regulation (DPR) Requests for Proposals for pest management grants are due at the end of November. For more information, contact **Bob Elliott** at DPR, Tel: (530) 324-4156; email: [belliot@cdpr.ca.gov](mailto:belliot@cdpr.ca.gov)

## Organic Research Grants

The Organic Farming Research Foundation is offering funds for research on organic farming methods, dissemination of research results to organic farmers and growers interested in making the transition to organic production, and consumer education on organic farming issues. Projects should involve farmers in design and execution, and take place on working farms when possible. Proposals of \$3,000-\$5,000 are encouraged. Matching funds and/or in-kind contributions are recommended. Proposals are considered twice a year; the next round of proposals must be received by **January 15, 1998**. To receive copies of grant application procedures and the OFRF Research and Education Priorities describing target areas, write Grants Program, Organic Farming Research Foundation, PO Box 440, Santa Cruz, CA 95061; Tel: (408) 426-6606.

## Fertilizer Research Awards

A Request for Proposals will be out in mid-January 1998 from the California Department of Food and Agriculture's Fertilizer Research and Education Program. Funding will be available for projects directed toward the environmentally safe and agronomically sound use and handling of fertilizer materials. For details and to be put on the mailing list, contact **Casey Walsh-Cady** or **Trina Anderson** at CDFA, (530) 653-5340; e-mail: [ccady@smtp1.cdfa.ca.gov](mailto:ccady@smtp1.cdfa.ca.gov).

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# Calendar

SAREP offers a regularly updated sustainable agriculture calendar on our World Wide Web Site at: <http://www.sarep.ucdavis.edu/> (click on "events"). Please feel free to add sustainable agriculture events to our Web site calendar.

## MONTHLY MEETINGS

*Lighthouse Farm Network* The Community Alliance with Family Farmers Foundation sponsors informal monthly meetings for growers to discuss issues related to pesticide use reduction. Contact: Jill Klein, CAFF, (530) 756-8518.

### October

**19-24** *2<sup>nd</sup> International Congress for Vector Ecology*, Orlando, FL. Contact: Gilbert Challet, PO Box 87, Santa Ana, CA 92702; Tel: (714) 971-2421, ext. 148; Fax: (714) 971-3940.

### November

**2-5** *Food & Natural Resource Systems: Integrating Diversity, Inquiry, Action & People*, 3<sup>rd</sup> North American Conference of the Assoc. for Farming Systems Research & Extension, in collaboration with Oregon State Univer. & Washington State Univer., Welches, Ore. Sessions on crop & livestock production, community food systems, watersheds, farming the urban fringe. Whole systems research featured in posters, displays, stories, town meeting facilitated discussion. Field tours. Contact: OMIT Agricultural Research Foundation, Stefan Seiter, Horticulture Dept., OSU, ALS 4017, Corvallis, OR 97331; (541) 737-5442; or Ray William, (541) 737-5441.

**3-5** *Annual Internat'l Research Conference on Methyl Bromide Alternatives & Emissions Reductions*, San Diego. Sponsors: Methyl Bromide Alternatives Outreach, The Crop Protection Coalition, US-EPA, US Dept. of Agriculture. Contact: Methyl Bromide Alternatives Outreach, (209) 447-2127.

**14-15** *1997 Conference on Urban/Rural Environmental, Food, Population and Agricultural Issues*. Kellogg West Conference Center, California State University, Pomona. Contact: Ardith Barr (909) 869-2212, email: [ajbarr@csu.pomona.edu](mailto:ajbarr@csu.pomona.edu).

**14-16** *12<sup>th</sup> Annual Sustainable Agriculture Conference*, Carolina Farm Stewardship Assoc., Hendersonville, North Carolina. Contact: Carolina Farm Stewardship Assoc., PO Box 448, Pittsboro, NC 27312; (919) 542-2402; [cfsa@sunsite.unc.edu](mailto:cfsa@sunsite.unc.edu).

### January 1998

**7-42<sup>nd</sup> Annual Tomato Day**, UC Davis. 8:30 a.m.-noon. Covers many aspects of tomato production. Information: (530) 754-9618.

**9-10 17<sup>th</sup> annual Oklahoma Horticulture Industries Show**, Northeast Campus, Tulsa Community College, Tulsa, OK. Educational programs/trade show activities for Oklahoma & surrounding states producers. Contact: Dean McCraw, Dept. of Horticulture & L.A., OSU, Tel: 405-744-5409.

**21-24 18<sup>th</sup> Annual Ecological Farming Conference**, Asilomar, CA. Bus tour Wed.; workshops, speakers Thurs.-Sat. Contact: Committee for Sustainable Agriculture, 406 Main St., Ste. 313, Watsonville, CA 95076; Tel: 408-763-2111, Fax: 408-763-2112.

**28-Feb. 1 3<sup>rd</sup> Annual Herb Business Winter Getaway Conference**, San Antonio, TX. Sponsor: Herbal Growing & Marketing Network. Contact: The Herbal Connection, PO Box 245, Silver Spring, PA 17575; (717) 393-3295; [HERBWORLD@aol.com](mailto:HERBWORLD@aol.com).

## **March**

**5-6 Building on a Decade of Sustainable Agriculture & Education: Sharing Experiences to Improve our Agriculture**, conference, Austin, TX. Sponsor: USDA Sustainable Agriculture Research & Education (SARE) program. Poster session, presentations, discussion groups, speakers, field trips, exhibitors. Contact: SARE, 0322 Symons Hall, Univer. of Maryland, College Park, MD 20742-5565; (301) 405-5270; email: [yberton@wam.md.edu](mailto:yberton@wam.md.edu); Web site: <http://www.ces.ncsu.edu/san/>.

## **June**

**4-7 Joint Annual Meeting Agriculture, Food & Human Values Society, & Assoc. for the Study of Food & Society**, San Francisco. Topics: food, dietary, nutritional behaviors; food & ag practices; ethical & values issues in food & ag; public policies. Papers, posters, panels sought (deadline Mar. 1). Contact: Jacqueline Newman, Queens College, CUNY, Dept. of Family Nutrition and Exercise Science, 6530 Kissena Blvd., Queens, NY 11367; tel: (718) 997-4150; fax: (718) 997-4163; email: [newman@qcvaxa.acc.qc.edu](mailto:newman@qcvaxa.acc.qc.edu).

**Table 1. Biologically Integrated Farming Systems - BIOS & BIFS**

First Year	Project Leaders & Cooperators	Title	Counties	Crop	Number of Farmers Crop Enrolled	Number of On-farm plots	Number of Acres in Program	Number of Acres Farmed by Project Farmers	Key Practices	Risk Reduction Targets	Conservation Practices	Research Needs
1993	CAFF (Karminder Aulakh & Marcia Gibbs), UC, UCCE, almond growers, Almond Board, RCD, NRCS, PCAs	Biologically Integrated Orchard Systems (BIOS) for Almonds	Merced, Stanislaus, Madera, San Joaquin, Colusa	Almonds	69	69	2079	10,500	B.t. at bloom, cover crops, enhancement & release of beneficial species, monitoring & action thresholds	Dormant & in-season OP insecticides, pre-emergence herbicides, nitrates	Cover crops, insectary plants	Diseases, Cover crop nitrogen dynamics
1994	CAFF (Karminder Aulakh), walnut growers, PCAs, UC	Biologically Integrated Orchard Systems (BIOS) for walnuts	Yolo, Solano	Walnuts	20	20	510	900	Cover crops, mating disruption, enhancement & release of beneficial species, monitoring & action thresholds	In-season OP insecticides, pre-emergence herbicides, nitrates	Cover crops, insectary plants, tailwater ponds	Cover crop nitrogen dynamics, codling moth, walnut blight, beneficial arthropods
1995	Lodi-Woodbridge Winegrape Commission (Cliff Ohmart), grape growers, PCAs, wineries, UCCE, UC	Implementing a Biologically Integrated Farming System for Winegrapes in the Lodi-Woodbridge Winegrape District	San Joaquin, Sacramento	Wine Grapes	40	56	2023	20,000	Cover crops, enhancement of beneficial species, monitoring & action thresholds, disease risk models, IPM	Nitrates, herbicides, insecticides	Cover crops, cow pea border strips for trap cropping	Eutypa & Fan Leaf monitoring & action thresholds for LH & mites, soil health
1995	UC Davis (Jeff Mitchell), UC Statewide IPM Project (Pete Goodell), cotton & vegetable growers, PCAs, UC, NRCS, UCCE	West Side on-Farm Demonstration Project - Extending Biologically Integrated Farming Practices within the San Joaquin Valley's West Side	Fresno	Cotton, Vegetables, Wheat	12	17	1653	90,000	Organic soil amendments, soil & plant testing to optimize fertility, crop rotation, time of planting, monitoring & action thresholds, IPM, trap cropping	Nitrates, herbicides, insecticides	Cover crops, cow pea border strips for trap cropping	Habitat for beneficial arthropods, strip/mulch till production, suppressive soils, water relation & cover crops

**Table 2. Additional Community-Based Biologically Integrated Farming Systems Projects in California**

First Year	Project Leaders & Cooperators	Title	Counties	Crop
1988	California Clean Growers (Paul Buxman, Fred Smeds, Mas Masumoto), UC, PCAs	Community Based Biologically Integrated Farming Systems for Family Farmers in the San Joaquin Valley	Fresno	Raisins, Table Grapes, Stone Fruit
1994	UCCE (Steve Scardaci), UC Davis (Jim Hill), Rice Experiment Station, Ducks Unlimited, Rice Growers Association	Rice Residue Management and Development of Seasonal Waterbird Habitat on Rice Fields	Butte, Colusa	Rice
1995	UC Davis (Carol Shennan), UCCE, USFWS Tulelake National Wildlife Refuge, University of Washington Wildlife Biology Unit, USBR Klamath, Oregon Graduate Institute	Rotational (Sump) Management of Wetlands and Cropland in the Tulelake Basin	Modoc	Potatoes
1995	Sun-Maid Growers (Joe Kretsch), Pew Charitable Trust, Fresno Pacific University, CSU, UC, PCAs, CRDA	Raisin Best Management Practices and Integrated Pest Management (BMP/IPM) Program	Fresno	Raisins
1995	UCCE Fresno County (Michael Costello), grape growers, PCAs, UC, CSU, Whitted and Associates	Biologically Integrated Vineyards Systems (BIVS) in the Central San Joaquin Valley	Fresno	Raisins, Wine, Table Grapes
1996	Bio-Integral Resource Center (William Olkowski), UC, tomato growers, W. R. Grace	IPM Reference Field Monitoring (RFM) for Processing Tomatoes and Annual	Yolo, Solano	Tomatoes
1996	Central Coast Wine Grape Grower Natural Vineyard Team(Craig Rous), grape growers, UCCE, Robert Mondavi Winery, Central Coast wineries	Central Coast Wine Grape Growers Natural Vineyard Team's Positive Points System	Monterey, Santa Barbara, San Luis Obispo	Wine Grapes
1996	Friant Water Users Authority (M. H. Wolfe & Associates), CDFG, Tulare FB, UC, USBR, NRCS	Revegetation for Weed and Pest Control on Rights-of-Way	Kern, Tulare	Rights-of-Way
1996	Napa County RCD (Dennis Bowker), Robert Mondavi Winery (DeWitt Garlock), grape growers, UC, RCD, NRCS, wineries, CAC, UCCE	Napa Sustainable Winegrowing Group's Napa River Watershed Integrated Pest Management	Napa	Wine Grapes
1996	Sonoma Valley Vintners & Growers Association (Olga Wickerhauser), UC (Lucia Varela), UCCE (Rhonda Smith), grape growers, RCD, NRCS	Development of Integrated Pest Management Approaches for Wine Grape Growing Areas of Sonoma Valley	Sonoma	Wine Grapes
1996	The Nature Conservancy (John Carlon), UC, UCCE, PCAs, CSU, NRCS, prune growers, Prune Board	Biological Prune Systems (BPS) for the Upper Sacramento Valley	Butte, Glenn, Tehama	Prunes
1996	UC Santa Cruz (Sean Swezey), Sustainable Cotton Project (Will Allen), cotton growers, PCAs, UC, UCCE	Biological Agriculture Systems in Cotton (BASIC) and the Sustainable Cotton Project (SCP)	Madera, Merced	Cotton
1996	Yolo County RCD (John Anderson), UCCE (Rachel Long), row crop growers, RCD, NRCS, UC	Total Resource Management and Use of Hedgerows for Farmland Ecosystem Management	Yolo	Row Crops
1997	Whitted & Associates (Larry Whitted), Southeast Asian strawberry growers, UCCE, NRCS	Biologically Integrated Strawberry Systems (BISS) in Fresno	Fresno	Strawberries
1997	The Nature Conservancy, BLM (Rick Cooper), Ducks Unlimited, SCPRD, WCB, Living Farms	Consumnes River Preserve Farm Center	Sacramento	Organic Rice, Grains, and Pasture
1997	UCCE Sutter/Yuba County (Janine Hasey), UC (Walt Bentley), cling peach growers, CCPA, CCPGAB	Biorational Cling Peach Orchard Systems	Sutter, Yuba	Cling Peaches

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