

## **UC Santa Cruz**

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2001-2003 Activity Report and Research Summary

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The CENTER for  
AGROECOLOGY  
& SUSTAINABLE  
FOOD SYSTEMS

The mission of the Center for Agroecology & Sustainable Food Systems is to research, develop, and advance sustainable food and agricultural systems that are environmentally sound, economically viable, socially responsible, nonexploitative, and that serve as a foundation for future generations.

# 2001 – 2003 ACTIVITY REPORT AND RESEARCH SUMMARY

**Center for Agroecology & Sustainable Food Systems**

*University of California, Santa Cruz*

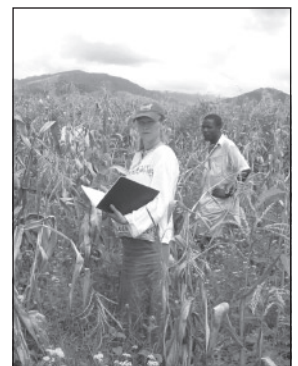
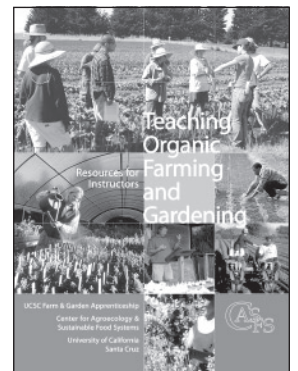
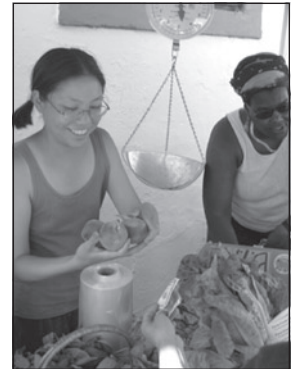
Several major milestones have marked the past two years for the Center for Agroecology & Sustainable Food Systems. In October 2002 we celebrated the 35<sup>th</sup> anniversary of the Alan Chadwick Garden's founding and with it the roots of the Apprenticeship course, a program that has produced more than 1,000 graduates trained in organic farming and gardening skills. The 30<sup>th</sup> anniversary of the UCSC Farm's groundbreaking took place in 2002, a year in which we also marked two decades since the Agroecology Program<sup>1</sup> was created to give a formal academic home to sustainable agriculture research and teaching at UC Santa Cruz.

As well as noting anniversaries, we've seen several of the Center's projects mature and bear fruit in the past two years. This includes our work on the California Central Coast Research Project. Supported by a grant from the U.S. Department of Agriculture, this project analyzes the impact of farming and other land uses on water quality in coastal watersheds, and examines food systems and alternative food initiatives in the five-county central coast area. With three years of data in hand and expanded research efforts now underway, project members have begun to better understand the steps it will take to improve both the environmental and social sustainability of the region's food and agricultural system.

In the winter of 2003 we completed one of the Center's most ambitious efforts—developing the classes and field exercises of our six-month Apprenticeship training program into a form that others can use. The result is a 600-page resource manual for instructors that has been widely praised as a valuable teaching tool.

Developing a first-class children's education garden has been a long-time goal of the Center and one of its affiliates, the Life Lab Science Program. In the spring of 2002 Life Lab's Garden Classroom was officially dedicated. Located on the UCSC Farm, the garden has already become an important resource for area students, teachers, and families. Life Lab staff offer a variety of tours, teacher training workshops, internship opportunities, and community events, and the Garden Classroom is the centerpiece of innovative garden-based education efforts in the state.

Along with the rest of California we've also faced a shrinking state budget. This economic challenge has forced us to sharpen our vision and focus our efforts on three areas in which we feel the Center has the strongest track record: the agroecology of farm landscapes, the sociology and political economy of sustainable food systems, and small-scale ecological/organic production and training. These three components will continue to shape our research, education, and outreach efforts in the years to come. Here we report on Center research projects and highlight accomplishments of our education and outreach work from July 2001 through June 2003.



# Research

With its blend of social and natural sciences staff, faculty, and students, the Center conducts research in a variety of farming and food systems areas. Topics range from community food security and consumer attitudes toward the food system, to biocontrol options and nutrient management on organic farms. Below is a summary of ongoing and completed research projects from the past two years—

## Sustainable Food Systems

### COMMUNITY SUPPORTED AGRICULTURE ON CALIFORNIA'S CENTRAL COAST

As part of a USDA-funded study of California's central coast farming practices and food systems, the Center's social issues staff is examining the effect of alternative production, marketing, and research efforts on both ecological sustainability and social conditions for growers and consumers.

Community Supported Agriculture (CSA) is a marketing alternative that's shown promise for keeping small-scale farmers in business and creating a connection between farmers and consumers. Center researchers used a written questionnaire, focus group interviews with CSA members, and interviews with CSA farmers to better understand whether central coast CSAs are fulfilling some of their promise, and identify constraints and opportunities of this system.

Results from the study show that CSAs have had positive impacts. CSA members are eating better and are showing evidence of being more connected to the source of their food. Farmers generally find CSAs to provide more security than most other marketing arrangements. Additionally, they are growing high quality produce and are incorporating ecologically sound farming methods into their production practices.



Victor Schiffrin

CSA manager Nancy Vail packs fresh produce for shareholders of the UCSC Farm & Garden's CSA project, which serves members of the campus community.

**Table 1.** Most frequently listed *most important* reasons for wanting to become a CSA member.\*

Response Categories	N	%
organic produce	170	62%
support or buy local	110	40%
fresh produce	94	34%
support organic (farms/farmers/agriculture)	44	16%
quality produce	39	14%
convenience	39	14%
support small or family farms/farmers	28	10%
health	26	10%
variety	26	10%
good price/value	23	8%
support sustainable agriculture	20	7%
eat seasonally	20	7%
know how/where food was grown	19	7%
other	28	10%

\*Only categories with more than 5% of members endorsing them were listed. 255 people (out of 274) responded to this question; 19 surveys (7%) had no response. All answers were coded, and there was an average of 3.08 reasons listed for each respondent. (Based on responses from central coast CSA members.)

Although central coast CSAs offer an important alternative for both growers and consumers, they still face challenges for long-term viability. Issues such as member attrition (most frequently due to lack of choice for quantity or product mix), availability of organic food from other sources, and a culture based on cheap food, convenience and choice could hinder the growth of CSAs.

In the spring of 2003, Center researchers received funding to expand their study of CSAs to the state of California, focusing in particular on the relationship between food security and small-farm security.

*CASFS:* Jan Perez, Patricia Allen, James Murrell. *Cooperator:* Julie Guthman, UCSC Community Studies Department. *Funding:* US Department of Agriculture, UC Sustainable Agriculture Research and Education Program

#### Related publications

Perez, J. 2002. Community supported agriculture on the central coast. *The Cultivar* 20:2, pp.1-3, 18.

Perez, J., P. Allen, M. Brown. 2003. Community supported agriculture on the central coast: The CSA member experience. Center Research Brief #1, Center for Agroecology & Sustainable Food Systems.

## CONSUMER PERSPECTIVES ON SUSTAINABLE FOOD SYSTEMS

Contemporary efforts to create change in the food and agriculture system increasingly focus on the potential power of consumer demand and choices. However, we know very little about consumers outside of opinions about price and convenience.

To learn more about consumer perspectives on sustainable food systems, Center staff conducted focus groups with consumers recruited from grocery stores and farmers markets. The goal was to learn more about what they know about the food system, what they would like to know, and their views on social and ecological issues. This research was conducted both to gain detailed insight into these issues, and to help prepare a larger-scale survey that supplements the qualitative data with quantitative information. The information will be used to identify potential directions for educational efforts on the social and ecological impacts of the current food system, particularly the issues that consumers will find most relevant to their concerns.

*CASFS:* Patricia Allen, Phil Howard, Jan Perez

*Funding:* US Department of Agriculture

## PERSPECTIVES AND STRATEGIES OF ALTERNATIVE FOOD INITIATIVES IN CALIFORNIA

People are working to construct new initiatives and civic organizations that challenge the existing food system and seek to build alternatives. Consumers, activists, and farmers have organized a growing number of alternative food initiatives (AFIs) that seek to incorporate values such as regionalism, seasonality, community, environmentalism, and food security into the food system.

In 2001, the Center's social issues researchers received a grant from the UC Sustainable Agriculture Research and Education Program (UC SAREP) to continue their study of groups and programs spearheading AFI efforts in California. The study's central question was: How are alternative food initiatives conceptualizing and creating change in the agrifood system? In order to answer this question the researchers conducted 37 interviews with organization leaders of nine different types of AFIs and nine focus groups with AFI participants.

Their findings show that there are many Californians concerned about the food system, and that they share a perception that food system problems have systemic and structural, rather than individual, causes. Despite this analysis, California AFIs are much more focused on local issues and activities than on broad issues and large-scale actions, with participants deeply engaged where they feel they can make a significant difference on a local level. While AFIs share general beliefs about problems and solutions in the agrifood system, they tend to work in isolation from each other.

*CASFS:* Patricia Allen. *Cooperators:* Margaret FitzSimmons, Mike Goodman, Keith Warner, UCSC Environmental Studies Department.

Staff of Farm Fresh Choice in Berkeley, California sell produce to community members. This alternative food initiative supports small-scale growers while offering fresh, nutritious produce to city residents.



Keith Warner

*Funding:* UC Sustainable Agriculture Research and Education Program

*Related publication*

Allen, P., M. FitzSimmons, M. Goodman, and K. Warner. 2002. Shifting plates in the agrifood landscape: The tectonics of alternative agrifood initiatives in California. *Journal of Rural Studies* 19: 61-75.

## THE POLITICAL CONSTRUCTION OF CALIFORNIA SCHOOL FOOD POLICIES AND PROGRAMS: A PRELIMINARY STUDY

Nationwide, schools serve 6.5 billion meals each year, affecting children, parents, teachers, and food producers and processors. Since their inception in 1946, school food programs have undergone little change until recently. But in the past several years, fiscal crises of school districts along with concerns about child nutrition and economic concentration in the food system have led to various innovations in school food programs and policies. These include banning on-campus sales of fast foods, soft drinks and other foods high in fat and sugar. In addition, some school districts have joined with the sustainable agriculture movement to develop farm-to-school food requisitioning programs, bringing together two seemingly unrelated issues—child health problems and the viability of small farms. Farm-to-school programs aim to increase the nutritional value of children's school meals while simultaneously providing a secure market option for small-scale growers.

A Center study initiated in 2003 is examining some of California's innovative school food projects to determine how school food programs are determined. The project addresses a variety of questions, including: How and why are different school food projects and programs developed? What roles are played by community demographics and locality? How are school policies negotiated among various constituents? Who gets included and why? How do some districts become innovators while others do not? How do budgetary considerations and/or entitlement availability affect what takes place? How do federal and state policies and programs shape what can be done?

In addressing these questions, the researchers hope to identify some of the most effective school food programs and pinpoint what has made them successful. This prelimi-





Students on a field trip to the Life Lab Garden Classroom (see page 10) learn about the “farm-to-fork connection” in an innovative program designed to teach kids about the source of their food.

nary work will form the basis of a broader research effort to assess the potential of school programs in furthering the development of sustainable food systems.

*CASFS:* Patricia Allen. *Cooperator:* Julie Guthman, Community Studies Department, UC Santa Cruz.

*Funding:* CASFS

#### **A SCHOLAR-ACTIVIST CONSORTIUM FOR SUSTAINABLE FOOD SYSTEMS**

Members of California’s sustainable agriculture movement have begun to tackle social justice issues that have often been shunted to the side in the interest of production-oriented technical advances. Within several key organizations, political will now exists to address the inter-related problems of food cost and accessibility, farm (and factory) labor wages, benefits, and conditions, and the viability of farms that incorporate agro-ecological practices.

The Center’s social issues researchers have worked for many years to address social as well as environmental issues in developing a sustainable agriculture and food system. In this study, the Center’s social issues staff and other UCSC academics will work with two non-governmental organizations (NGOs) to address social issues in agriculture. This effort aims to bridge the gap between academics and activists by making academic work more relevant to the activists’ efforts.

Work will focus on collaboration with NGOs, including the California Sustainable Agriculture Working Group (CSAWG) and the California Food and Justice Coalition (CFJC). Plans for the project include holding meetings with NGO leaders who are working on sustainable food systems to establish working relationships, discuss shared agendas, and plan a one-day workshop for January 2004 in conjunction with the Ecological Farming Conference in Asilomar, California.

*CASFS:* Patricia Allen, Phil Howard, Jan Perez. *Cooperators:* Julie Guthman, Community Studies Department, UC Santa Cruz; CSAWG; CFJC.

*Funding:* UC Santa Cruz Center for Global, International and Regional Studies (CGIRS), CASFS

## **Farming Systems and Agroecology**

### **MONTEREY BAY WATERSHED WATER QUALITY MONITORING**

Maintaining water quality is an ongoing challenge in the Monterey Bay watershed, where industry, urban development, and farming all affect sensitive waterways. Center researchers are collaborating with researchers, growers, and management agencies in the Pajaro River and Elkhorn Slough watersheds to monitor and identify the impacts of various land uses on water quality, and advise growers on ways to minimize soil erosion and runoff from their farms. Both watersheds drain into the Monterey Bay National Marine Sanctuary, the largest such sanctuary in the U.S.

Initiated in fall of 2000, the Center’s water quality monitoring efforts focus on nitrate and phosphorous levels in rivers, creeks, and agricultural drainages. In the study’s first two full seasons (through 2002) the researchers found that nitrate-N concentrations were <1 mg/L in creeks bordering grazing lands, oak woodlands, and forests, but increased to a range of 3 to 5 mg/L (high enough to adversely affect ecosystem function) as surface waters passed through agricultural lands. In several agricultural ditches—especially those receiving drainage from underground pipes (“tiles”)—very high nitrate concentrations (>50 mg/L) occurred. Some ditches remained high in nitrate both during and after rain events, indicating that nitrate is not being flushed out of the soil profile. In addition, monitoring results indicate that phosphorous concentrations were also high in much of the region, particularly in areas affected by agriculture. Understanding how surface water quality changes is further complicated by seasonal variation in water movement between surface and groundwater sources. Center researchers are collaborating with hydrologist Andy Fisher to develop methods for assessing rates and directions of water flow in and out of streams

Results of this ongoing monitoring work are being used to help landowners and resource managers understand the relationship between land use activities and local water quality, and to help growers reduce nutrient runoff. We recently expanded the range of this study to include upper reaches of the Pajaro River watershed, which are major contributors to downstream water quality problems.

*CASFS:* Marc Los Huertos, Lowell Gentry, Carol Shennan. *Cooperators:* Andy Fisher, Earth and Marine Sciences, UCSC; Community Alliance with Family Farmers, Monterey Bay National Marine Sanctuary, Natural Resources Conservation Service, Santa Cruz County Farm Bureau, UC Cooperative Extension, USDA-Agricultural Research Service, Watershed Institute at CSU Monterey Bay. *Funding:* US Department of Agriculture, Regional Water Quality Control Board

#### *Related publications*

Los Huertos, M., L. Gentry, and C. Shennan. 2003. Land use and water quality on California’s central coast: Nutrient levels in coastal waterways. Center Research Brief #2, Center for Agroecology & Sustainable Food Systems.

Los Huertos, M., L. E. Gentry, and C. Shennan. 2001. Land use and instream nitrogen concentration in coastal agricultural watersheds. *In* Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *TheScientificWorld* 1. www.thescientificworld.com.

### LYGUS HESPERUS CONTROL IN STRAWBERRIES

The lygus bug, *Lygus hesperus*, is a major pest of strawberries on California's central coast. Center researchers have spent several years developing an effective "trap crop" system for this pest. Early-season plantings of radish and late-season plantings of alfalfa are established at the borders of the fields, creating a continuous bloom throughout the cropping season and attracting lygus bugs away from the strawberry crop.

In 2001 the research group began testing the efficacy of "vacuuming" some of the trap crops with a tractor-mounted bug vac (a device already in use by some growers) to remove lygus. Vacuuming stands of trap crops rather than the entire strawberry field would save considerable time and energy, as well as conserving populations of natural enemies in the fields.

Initial results of the vacuuming study were promising enough to attract funding for a much larger study, which involves a large certified organic strawberry grower. In this ongoing effort, researchers monitor the effects of a twice weekly vacuuming program to see whether it controls lygus populations both in the trap crops and the strawberry crops. They also monitor for lygus damage in strawberries adjacent to the trap crops as well as those farther from the field edge.

CASFS: Janet Bryer, Diego Nieto, Ruth Holbrook, Sean Swezey. Cooperator: Pacific Gold Farms.

Funding: USDA Western Sustainable Agriculture Research and Education program

#### Related publication

Brown, M. 2002. USDA grant funds lygus study. *The Cultivar*, 20:1, p. 11.

### ANAEROBIC COVER CROP DECOMPOSITION TECHNIQUE TO CONTROL VERTICILLIUM

Vascular wilt caused by the fungal pathogen *Verticillium dahliae* is a common disease of many crops, but strawberries are particularly susceptible and no resistant varieties are available. The soil fumigant methyl bromide is used to control *Verticillium* in conventional systems, but the disease poses a major challenge for organic producers. Because a wide range of crops, such as tomatoes, potatoes, peppers, lettuce, and apples, host the *Verticillium* and build up fungal propagules in the soil over time, organic growers use long rotations (up to 7 years) to avoid problems with the disease. This makes it necessary to continually find ground that is free of *Verticillium*.

Center researchers are experimenting with an approach used in Europe to control *Verticillium* infestations. The idea



Ohri Yamada

A strawberry ranch employee uses a "bug vac" to suction insects from a stand of trap crops adjacent to a strawberry field.

is to create anaerobic soil conditions following plant residue incorporation by covering the ground with a tarp that prevents oxygen from entering the soil. Byproducts from the resulting anaerobic decomposition process kill the *Verticillium* fungus; once the tarp is removed and oxygen returns to the soil, the byproducts dissipate rapidly.

In fall 2002, a row crop area on the UCSC Farm known to have high levels of *Verticillium* was cover cropped with two replicated treatments: a standard oat grass/bell beans/vetch mix, and mustard (*Brassica juncea*), which is also thought to suppress *Verticillium*. The cover crop treatments were turned under in spring 2003 and the site sealed with an airtight tarp for 15 weeks, then uncovered in the summer. Soil analysis to test *Verticillium* reduction from the treatments is underway; if levels have been sufficiently reduced, strawberries will be planted in fall 2003. Shorter tarping periods and different cover crop biomasses will also be tested.

CASFS: Joji Muramoto, Carol Shennan, Jim Leap. Cooperator: Steve Koike, UC Cooperative Extension.

Funding: US Department of Agriculture

### PERENNIAL VS. ANNUAL COVER CROP TRIALS

Sustainable farming practices include improving soil conditions by planting cover crops. In 2002, Center researchers and affiliated faculty established trials at the Center's Farm to compare two cover cropping strategies: a one-year fallow treatment cover crop of perennial rye grass, overseeded after a few months' growth with crimson clover, versus an annual winter cover crop treatment (bell bean, vetch, oat grass mix). The researchers were particularly interested in the levels of organic matter generated by each treatment, the nitrogen available to crops following the cover crops' incorporation, and the potential for nitrogen losses through leaching.

Researchers found that available nitrogen in the perennial cover crop treatments was consistently lower through most of the experiment. Yields of broccoli (a nitrogen-sensitive crop) planted after the cover crops were incorporated were significantly lower in the perennial cover crop treatment. However, yields of a potato crop planted following the cover crops were not affected by the treatments. In addition, soil respiration remained higher in the perennial

cover crop treatment, even following the cover crop's incorporation, suggesting higher levels of microbial populations in the soil.

One reason for relatively lower available nitrogen from the perennial cover crop was the poor establishment of the overseeded clover due to slug and gopher damage. Nitrogen limitation for subsequent crops would be reduced with a good clover stand or with an addition of compost at the time of the perennial cover crop's incorporation.

Despite the impact on yields, the goals of organic production (e.g., soil building, decreased nitrogen loss) may justify the use of perennial covers and fallow periods to improve soil quality, especially in systems undergoing the transition from conventional to organic management where soil organic matter and microbial activity levels tend to be low.

**CASFS:** Jim Leap, Marc Los Huertos, Carol Shennan. **Cooperators:** Weixin Cheng, Michael Loik, UCSC Environmental Studies Department.

**Funding:** US Department of Agriculture

#### **GARDEN SYMPHYLAN MONITORING AND CONTROL**

The garden symphylan (*Scutigera immaculata*), also known as the garden centipede, is a tiny, active soil pest that feeds on developing plant roots and stunts or kills germinating seeds and transplants. Symphylan infestations at the Center's on-campus organic farm have prompted staff to search for organically acceptable control strategies, which have not been well characterized and tested to date. An ongoing study, initiated at the UCSC Farm in 1998, analyzes various monitoring techniques and control options for symphylans.

Leap and researcher Jon Umble of Oregon State University have observed that potato crops appear to suppress symphylan populations, thus limiting or eliminating symphylan damage not only to the potato crop itself, but also to crops that follow potatoes in the rotation. This suppressive effect of potatoes has been duplicated at other farms and in the laboratory.

Based on these promising results, a study designed to pinpoint how potatoes and other *Solanum* species (e.g., tomatoes, peppers) affect populations of the garden symphylan, both through field trials and in the laboratory, is now underway.

The research team will also work to improve symphylan monitoring techniques so that growers will be better able to evaluate the levels of symphylans in their soils and make appropriate management decisions. The UCSC Farm serves as one of the three organic research sites for the study, which also includes two conventionally managed sites.

**CASFS:** Jim Leap. **Cooperators:** Jon Umble, Oregon State University; Mark Van Horn, UC Davis Experimental Farm.

**Funding:** USDA Western Sustainable Agriculture Research and Education program

#### *Related publication*

Brown, M. Symphylans challenge growers and researchers. *The Cultivar* 19:1, 1–3, 15.

#### **ANALYSIS OF CABBAGE APHID INTERACTIONS WITH ORGANIC BROCCOLI CROPS AND NON-CROP VEGETATION**

Broccoli plants infested with the cabbage aphid (*Brevicoryne brassicae*) may be damaged to the point that they are unharvestable. In an ongoing study initiated in the spring of 2001, Center researchers are examining factors that affect the degree of aphid infestation, including the plant's location in the field, the impact of wind direction, the growth stage of the broccoli when the aphids arrive (arrival time), and the location of the aphid colony on the plant itself. The project is located at the former Ft. Ord military base, where UC Santa Cruz leases land to Pure Pacific Farms for organic vegetable production, and at the Center's UCSC Farm; it will continue through the 2004 cropping season.

Researchers are also examining the effect of planting a "good bug blend" of over a dozen species, mostly clovers, cornflowers, and poppies, adjacent to the broccoli crop. They are interested in whether the blend can attract sufficient beneficial insects to help control aphid infestations in the broccoli crop.

**CASFS:** Diego Nieto, Bill Settle, Carol Shennan. **Cooperators:** John Savage, Pure Pacific Farms. Jeff Honda, Rachel O'Malley, San Jose State University.

**Funding:** US Department of Agriculture, San Jose State University

#### **VEGETATION CONSERVATION PRACTICES FOR WATER QUALITY AND HABITAT DIVERSITY ON PAJARO VALLEY FARMS**

California's central coast supports some of the most diverse agricultural and environmental habitats in the state. Unfortunately, many water bodies (streams, creeks, etc.) in the region do not meet water quality standards, due in part to agricultural runoff.

In addition, a great deal of the central coast's Pajaro Valley watershed has been denuded of vegetation, thus exacerbating runoff and erosion problems. By demonstrating that revegetation of farm borders, ditches, and roadways can benefit growers and landowners, the threats associated with poor water quality may be reduced.

On-farm revegetation with native perennial hedgerows can help control soil erosion and runoff, as well as provide habitat for beneficial insects. In an ongoing study initiated in fall 2002, Center researchers are monitoring insect populations in hedgerows, focusing on four native plant species: *Achillea millefolium* (yarrow), *Baccharis pilularis* (coyote brush), *Ceanothus* sp. (California lilac), and *Eriogonum* sp. (buckwheat). Research questions being addressed in this study include which natural enemies are attracted to these plants, when their populations are most abundant, and if there is the potential to attract pests as well.

**CASFS:** Janet Bryer, Diego Nieto, Ruth Holbrook, Sean Swezey. **Cooperators:** Sam Earnshaw, Community Alliance with Family Farmers. **Cooperating farms:** Dura Farms, Garroutte Farms, Gizdich Farm, High Ground Organics.

**Funding:** State Water Resources Control Board



# Education

## CONSERVATION TILLAGE TRIAL

Growers in the Midwest have long used no-till and low-till systems to help preserve soil organic matter and minimize tillage costs. However, most of these systems rely on chemical herbicides to control weeds.

A tillage trial on the UCSC Farm examined ways to incorporate conservation tillage practices into organic row crop systems. Cover crop trials were conducted to identify crops or blends that could form a weed-suppressing mulch. Triticale/Merced Rye/Common Vetch and the Barley/Common Vetch treatments both created a thick surface mulch. However, the Lighting Persian Clover/Paradana Balansa Clover/Antas Subclover did not generate enough surface mulch to suppress weeds.

Winter squash were planted into the flail mowed or chopped cover crops in June 2001, and a tillage treatment was established for comparison. Yields of winter squash from the conservation tillage treatments were significantly lower than those from the tilled treatment, due in part to competition for water, weed competition, and gopher damage. These results point up the need to modify the conservation tillage system—perhaps by opening larger planting areas in the surface mulch—in order to use this technique effectively.

CASFS: Jim Leap, Carol Shennan. *Cooperator:* Jeff Mitchell, UC Cooperative Extension.

*Funding:* Organic Farming Research Foundation

## NUTRIENT BALANCE STUDY ON THE UCSC FARM

One goal of soil management is to provide crops with sufficient nutrients to thrive, but not overapply nutrients that might end up leaching from the soil. Antonio Abboud conducted a nutrient balance study at the Center's UCSC Farm during the 2001–2002 cropping season to examine whether the levels of compost and other nutrient applications were appropriate to the yields being produced.

Nutrient inputs from compost and cover crops, and nutrient exports based on crop yields, residues, and weeds were analyzed. He found that the nitrogen input required by N-fixation from legume cover crops to balance outputs was approximately 60/kg/ha per year, which is a reasonable expectation. He found that although nitrogen and phosphorous appear to be in balance—i.e., compost and cover crop inputs are balanced by the nutrients in crops produced—there was a negative potassium balance. This may be explained in part by historical applications of potassium-rich compost.

Research is now underway to estimate annual biological nitrogen fixation levels using a wide variety of approaches, including measuring nitrogen in cover crops and nitrate levels in soil water.

CASFS: Jim Leap, Carol Shennan. *Cooperators:* Antonio Abboud, Universidad Federal Rural do Rio de Janeiro, Brazil; Katie Monsen, Rosa Shira Schneider, UCSC Environmental Studies Department.

*Funding:* US Department of Agriculture, CASFS

The Center offers a range of educational opportunities, from support and facilities for UCSC undergraduate classes and internships to its six-month training course in organic farming and gardening. Center staff and faculty affiliates also provide students interested in agroecology, sustainable agriculture, and food system issues with resources and expertise. Here are some highlights from the Center's education work over the past two years—

## Academic Instruction

Serving UCSC's undergraduate and graduate students is a primary focus of the Center's education work. In the past two years more than 600 UCSC students used the Center's Farm, Alan Chadwick Garden, Life Lab Garden Classroom, and on-site laboratories for classes and research. The Center's competitive grants program provided crucial funding for graduate and undergraduate student fieldwork. And the Center's affiliated faculty and staff, along with staff of the Life Lab Science Program, offered students internship, independent study, and research opportunities that helped them hone their academic and field research skills.

### ***Practicum Blends Classroom Study, Hands-On Learning***

Initiated in winter 2002, the Agroecology Practicum course offers UCSC undergraduates the chance to learn about the scientific concepts that form the basis for agricultural management practices such as soil care, plant propagation, and orchard production. Instructors included Center director Carol Shennan and the staff of the Center's Apprenticeship training course. Students spent time in the greenhouse, fields, and orchards developing hands-on skills and research projects that complemented classroom presentations.

The UCSC Farm provides graduate student **S a j e e m a s Pasakdee** with an organically certified site for her PhD program research.



Jon Kersey





A Center research grant helped fund UCSC graduate student Dorothy Overpeck's fieldwork on maize intercropping in Malawi.

### **Students Benefit from Center Grants Program**

The Center's competitive research grants program offers students both financial support and a chance to develop their grant-writing skills. Grants help fund graduate students' field projects and undergraduate senior thesis projects. Examples of research grants awarded in 2001–2003 include —

#### *Undergraduate Student Awards*

Serena Coltrane-Briscoe: Farm to School—Availability of Organic Food on Campus

Eric Hummel: Farmer Production of Organic Seeds

#### *Graduate Student Awards*

Ariane de Bremond: Land Rights, Land Use and Environmental Governance in the Post-War Resettlement of Agrarian Landscapes in El Salvador

Tara Pisani Gareau: Survey of the Ecological and Cultural Value of Hedgerows in the Elkhorn Slough Watershed of California

Jill Harrison: Drifting into Action—Grassroots Critique of Pesticide Drift and its Contribution to Sustainable Agriculture in California

Katie Monsen: Seasonal Nitrate Movement in Soil and Soilwater Profiles Under Organic Management Practices

Dorothy Overpeck: An Interdisciplinary Analysis of the Agricultural Sustainability—A Case Study from Southern Malawi

Keith Douglass Warner: Nature, Networks, Knowledge and Risk in California Winegrape Partnerships

### **Agro-Food Working Group Offers Social Issues Forum**

Six years ago, Center social issues specialist Patricia Allen helped establish the Agro-Food Studies Research Group, which brings together a multi-disciplinary collective of UCSC faculty, staff, and graduate students for a series of seminars throughout the academic year.

Some themes of current research interest include organic agriculture; integrative approaches to food production and consumption; California agriculture, labor and social justice; and globalization, international markets and 'Fair Trade'. Center staff are active participants in the forum. For more information, see [www2.ucsc.edu/cgirs/research/environment/afsrg](http://www2.ucsc.edu/cgirs/research/environment/afsrg).

### **Farm & Garden Oral History Published**

Environmental Studies undergraduate student Maya Hagege received a Center grant to do a series of interviews with those involved in the early years of the Alan Chadwick Garden and UCSC Farm. Her collection of interviews, done as part of her senior thesis project, was published in spring 2003 by UCSC's University Library as part of its Regional History Project. The collection, "The Early History of UC Santa Cruz's Farm and Garden," captures the stories of some of the key people involved in establishing the Student Garden Project (now the Alan Chadwick Garden), which led eventually to the Farm's founding. Both sites are key to the Center's current research and education programs.

### **Program in Community and Agroecology Established**

Steve Gliessman, the Center's founding director, along with Center faculty affiliate Jenny Anderson of Environmental Studies and writing professor Donald Rothman, developed the Program in Community and Agroecology (PICA) in the fall of 2002. PICA offers UCSC undergraduates who are interested in developing links among food, the land, and community a learning program that focuses on environmental and social justice issues facing farming communities around the world. Students attend seminars and receive sustainable gardening training using the principles of agroecology, then put these skills to work in the gardens at UCSC and in the community. PICA's long-term goal is to prepare students to build, work in, and live in communities after they leave UCSC. Center staff provide PICA students with work opportunities at the farm, access to farming and gardening materials, and advice for developing their own on-site gardens.

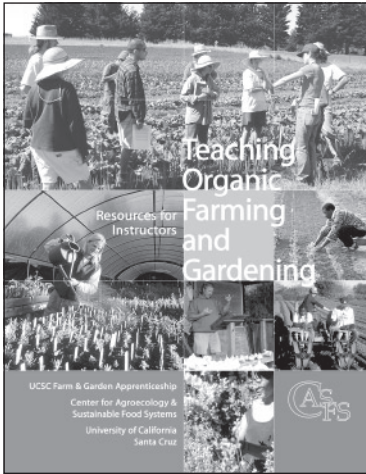
## **Apprenticeship Training Program**

The Center's Farm & Garden Apprenticeship program celebrated its 35<sup>th</sup> anniversary in 2002. Over the past three and a half decades more than 1,000 people have learned the basic skills of organic farming and gardening in a course that combines traditional lecture classes with hands-on training. Offered by the Center through UCSC Extension, the six-month program attracts participants from throughout the U.S. and abroad.

Apprenticeship course graduates use their training to establish their own farms and commercial market gardens, run community gardens, and develop school gardening programs. Many graduates take part in international development and food security programs. A number of graduates pursue further academic training, while others work in food policy projects, organic certification, and the organic food industry.

### **Training Manual Published**

The Apprenticeship has long been seen as a model for experiential training in organic farming and gardening, and program staff are often asked to share their expertise and lesson plans. Drawing on the course's 35-year history, Ap-



*Teaching Organic Farming and Gardening* covers practical aspects of organic farming and gardening, applied soil science, and environmental and social issues in agriculture.

prenticeship staff and seven invited authors wrote and produced a curriculum guide, *Teaching Organic Farming and Gardening: Resources for Instructors*, published by the Center in January 2003.

The 600-page manual presents detailed lecture outlines, demonstrations, field exercises, and print- and web-based resources for teaching the basic skills and concepts covered in the six-month program. Included are units on skills and practices, such as soil fertility management, tillage and cultivation, irrigation, and pest management; applied soil science, with units on physical properties, chemistry and fertility, and soil biology and ecology; the history of conventional and organic agriculture; and an introduction to social and environmental issues as they relate to agriculture and food systems. Although much of the material is designed for field or garden demonstrations and skill building, the curriculum can also be tailored to a classroom setting.

*Teaching Organic Farming and Gardening* has been lauded as the benchmark for this type of training resource. Those ordering the manual include staff of Cooperative Extension offices, Master Gardeners' groups, farm-based apprenticeship programs, other college- and university-based training programs and environmental studies departments, and a number of non-governmental organizations, including the Appalachian Sustainable Development program, New England Small Farm Institute, Organic Trade Association, Seattle Tilth Association, Northeast Organic Farming Association, and the the Humane Society of the U.S. The training manual is also available free in PDF format on the Center's web site. Primary funders for the project included the Richard & Rhoda Goldman Fund, Organic Farming Research Foundation (OFRF), Mary A. Crocker Trust, and the Arkay Foundation.

Apprenticeship staff are developing a new instructional manual focusing on direct-marketing through innovative means such as Community Supported Agriculture (CSA). This manual, funded by the True North Foundation, OFRF, and Foundation for Sustainability and Innovation, will be available in print and on the web site by summer 2004.

### **Apprenticeship Staff Join Education Consortium**

In 2002, staff members of the Center's Apprenticeship program were invited to join a consortium of California university and college farm managers and educators interested in sustainable agriculture, and in using college farms for practical training and course laboratories. The Center was asked to take a lead in coordinating a statewide curriculum project with the group's members—college farm instructors, faculty, and administrators from the California State University, University of California, and Community College systems.

The curriculum project, funded by a Kellogg Foundation grant in support of the California Food, Fibers, and Future effort, will result in a course outline and instructional resource list for a farm-based sustainable agriculture course that can be adapted for use across a range of the state's colleges and universities.

### **Funders Support New Training Opportunities**

Grants and gifts from a variety of funders helped support the Apprenticeship's operating expenses and made possible new programs and opportunities. In 2002 a gift from Nan Tucker McEvoy allowed the Center to expand its scholarship offerings. The Margoes Foundation once again funded scholarships for African participants in the Apprenticeship. And the Dash family continued to provide annual scholarship support in memory of Honore Dash.

Also in 2002, the Stanley Smith Horticultural Trust awarded a grant to support the creation of a new perennial border, a terraced garden, and interpretive material as part of a demonstration on organic landscaping and ornamental care. Apprenticeship staff worked with students to develop these projects.

The Chez Panisse Foundation continued its support in 2001–2003, funding a series of apprentice and public cooking classes focused on local, seasonal organic ingredients. Heidi Schlecht and Amy Linstrom of Feel Good Foods also developed a cooking manual for students in the Apprenticeship course.

Important core support for the Apprenticeship and the CSA program was provided by the David B. Gold Foundation, Stonyfield Farm, Inc., Newman's Own, Newman's Own Organics, True North Foundation, Earthbound Farms, and the Wallace Genetic Foundation.

Thanks to a grant from the Margoes Foundation, Lydiah Gatere came from Kenya to take part in the 2001 Apprenticeship course and stayed on as an assistant instructor in 2002.



Marci Krauss

# Academic & Community Outreach

Presentations on food systems, farming, and water quality issues; tours for visiting master gardener groups, culinary institute students, and international agricultural researchers; gardening classes for community members; children's garden education programs—all of this and much more were part of the Center's academic and community outreach work over the past two years. Here are some highlights of that work—

## Center Researchers Present Findings

Patricia Allen, Jan Perez, and Phil Howard presented their studies on alternative agrifood initiatives, the Community Supported Agriculture (CSA) movement, and consumer perspectives on the food system at a number of national and international conferences. This includes the California Food Security Summit; Joint Meetings of the Agriculture, Food, and Human Values Society and the Association for the Study of Food and Society; and International Perspectives on Alternative Agro-Food Networks: Quality, Embeddedness, Bio-Politics.

Marc Los Huertos, Lowell Gentry, and Center director Carol Shennan reported on results of water quality monitoring at the Agronomy and Soil Science Society meetings; at a meeting on management of agricultural and urban runoff for the California Coastal Commission; and at the Monterey Bay Regional Ag Expo and Agricultural Seminar. Los Huertos also taught several courses organized by UC Cooperative Extension designed to help growers develop water quality management plans.

Director Shennan traveled to Europe in fall 2002, where she gave a talk at the University of Southampton's Geography Department on her research on crop rotation strategies to improve farming conditions and wildlife habitat in the Tulelake Basin. She discussed the Center's research, education, and outreach work to members of Wye College, home to the Centre for European Agri-Environmental Studies. And at the University of Wageningen in the Netherlands, Shennan presented information on the Center's water quality monitoring work to the Biological Farming Systems Research and Education Group.

## Center Work Presented at Yale Colloquium

Center director Carol Shennan was invited to present a seminar at the Yale Agrarian Studies Colloquium series at Yale University in winter 2003. In her presentation, entitled "Bridging disciplines and the theory/practice divide: The challenges and successes of the UC Santa Cruz Center for

Agroecology & Sustainable Food Systems," she discussed some of the influences that have shaped the Center's work and mission, and raised questions about the role of public universities and science in social change, particularly within the food and agriculture system.

## Center Research Brief Series Debuts

In January 2003 the Center initiated a Research Brief series to provide timely reports of Center research activities. The briefs are intended for growers and researchers, extension personnel, policymakers, and others interested in the Center's research projects.

Initial titles in the series report on work from the Central Coast research project. Brief #1, *Community Supported Agriculture on the Central Coast: The CSA Member Experience*, details the experiences of CSA members in California's 5-county central coast region. Brief #2, *Land Use and Water Quality on California's Central Coast: Nutrient Levels in Coastal Waterways*, reports on two years of water quality monitoring data, focusing on nitrate and phosphorus levels in the Pajaro River and Elkhorn Slough watershed. A third title that summarizes the Center's research on alternative agrifood initiatives will be published in fall 2003. Research briefs and other Center publications are available free by contacting the Center or can be downloaded from our web site (*see page 12 for contact information*).



The Research Briefs series offers timely reports on Center research projects.

## Life Lab's Garden Classroom Opens

In June 2002 the Life Lab Science Program celebrated the opening of Life Lab's Garden Classroom. Located at the Center's 25-acre on-campus farm, the Garden Classroom offers a one-acre model for school garden projects. Through class visits, summer camps, and self-guided tours, young visitors explore soil science, pollination, and plant adaptations, composting, and solar power.

Other projects include a "Field to Market to You" program that teaches fifth grade through middle school students





A young visitor to the Garden Classroom with one of the garden's kid-friendly hens.

about food systems and consumer education; and a local agricultural history project for second and third graders. These programs served more than 4,000 students over the past two years.

The Garden Classroom also hosted workshops for over 700 teachers learning about garden-based science education. Fifty-two UCSC undergraduate students developed projects and led tours at the garden as part of internship programs. UCSC students in undergraduate and masters-level education programs learned about science education techniques from Life Lab staff. For more information about the Garden Classroom, see [www.lifelab.org](http://www.lifelab.org).

### **Friends Expand Public Education with New Classes, Collaborations**

The community-based *Friends of the UCSC Farm & Garden* are a key part of the Center's public education work, providing funds and volunteer energy to cosponsor a wide variety of community programs. Over the past two years the Friends helped stage or staff more than sixty public workshops, classes, and outreach events that reached members of the local community with information on organic gardening and farming.

Thanks to a grant from the Chez Panisse Foundation, the Friends were able to offer their first series of public cooking classes, emphasizing locally produced organic ingredients. Other new offerings included classes on garden structures and solar greenhouses, and a popular gopher control workshop.

The Friends and the Center also teamed with the Community Alliance with Family Farmers (CAFF) to kick off CAFF's "Buy Fresh, Buy Local" campaign at the 2002 Harvest Festival, held at the UCSC Farm. The festival drew nearly 1,000 community members to enjoy food and music, gardening talks and other events, and to learn about ways to support the region's local farmers.

Judges look over the entries in the apple pie contest, one of the activities at the annual Harvest Festival on the UCSC Farm.



Laura Ridenour

### **Center Staff Participate in Farm Bureau's Focus Ag Program**

Christof Bernau, who manages the handworked gardens at the Center's UCSC Farm, and Nancy Vail, the Center's Community Supported Agriculture coordinator, took part in the 2003 Focus Ag program sponsored by the Santa Cruz County Farm Bureau. Focus Ag teaches community leaders, policy makers, and educators about agricultural issues in Santa Cruz and Monterey Counties. The program was developed after a survey demonstrated a lack of knowledge about agriculture among people in the region—a region where agriculture and tourism are the leading economic activities.

Center director Carol Shennan has joined the Focus Ag Board of Directors, which carefully reviews feedback from participants in the program. According to Shennan, Focus Ag is seen as a model for improving the visibility of agriculture.

## **Funding Sources, 2001 – 2003**

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Stuart Ableson  
 The Arkay Foundation  
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 Honore Dash Family  
 Earthbound Farms  
 Foundation for Sustainability and Innovation  
 Foxwhelp Fund of the Tides Foundation  
 Friends of the UC Santa Cruz Farm & Garden  
 David B. Gold Foundation  
 Richard and Rhoda Goldman Fund  
 Kellogg Foundation's California Food, Fiber, and Futures (CF3) Initiative  
 John Kinder  
 Margo's Foundation  
 Nan McEvoy  
 Newman's Own  
 Newman's Own Organics  
 Organic Farming Research Foundation  
 Stanley Smith Horticultural Trust  
 Stonyfield Farm Yogurt, Inc.  
 Triebig Family  
 True North Foundation  
 UC Sustainable Agriculture Research and Education Program  
 US Department of Agriculture  
 Wallace Genetic Foundation  
 Harry O. Warren Endowment

### ADDITIONAL PUBLICATIONS

- Francis, C., G. Liebein, S. Gliessman, T. A. Breland, N. Creamer, R. Harwood, L. Salomonsson, J. Helenius, D. Rickerl, R. Salvador, M. Wiedenhoeft, S. Simmons, P. Allen, M. Altieri, C. Flora, and R. Poincelot. 2003. Agroecology: The ecology of food systems. *Journal of Sustainable Agriculture* 22 (3): 99-118.
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The Center for Agroecology & Sustainable Food Systems is located at the University of California, Santa Cruz. On the UCSC campus, the Center manages the 3-acre Alan Chadwick Garden and the 25-acre UC Santa Cruz Farm. Both facilities are open daily to the public from 8 am to 6 pm.

For more information about the Center and its activities, contact us –

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Reference from page 1 –

<sup>1</sup>In 1994 the Agroecology Program was renamed the Center for Agroecology & Sustainable Food Systems

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