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*From the Director*

## **SAREP's Strategic Plan 2000**

On September 24, 2000 Governor **Gray Davis** signed into law AB 2663, the sustainable agriculture bill authored by Assemblywoman **Helen Thomson** (D-Davis). Co-sponsored by Assemblywomen **Hannah-Beth Jackson** (D-Central Coast) and **Patricia Wiggins** (D-Santa Rosa), the bill requests the Regents of the University of California to adequately fund its sustainable agriculture programs. A wide range of agriculture research and education stakeholders, including the California Association of Winegrape Growers, Natural Selection Foods, the California Walnut, Apple, Strawberry and Lodi-Woodbridge Winegrape commissions, the Community Alliance with Family Farmers, the Organic Farming Research Foundation and other members of the California Sustainable Agriculture Working Group supported AB 2663.

The Governor said: "I am signing AB 2663, which states legislative intent that sustainable agriculture programs at the University of California be adequately funded and incorporated into appropriate State of California programs to ensure that farmers and ranchers will have access to that information."

We at SAREP welcome the language and intent of AB 2663, and wish to thank Governor Davis, Assemblywoman Thomson and co-sponsors, and the numerous farm and sustainable agriculture organizations which supported the bill. New budgetary resources would allow the immediate reinvigoration of SAREP research and education grants, Biologically Integrated Farming Systems (BIFS) partnership grants, methyl bromide alternatives grants, and would also allow the funding of new initiatives to add value to existing county extension programs and split academic research appointments with campus departments.

Assemblywoman Thomson said: "UC SAREP has evolved into one of the nations leading centers for on-farm research and assistance to growers who are seeking ways to make their agricultural operations more sustainable and improve their business long-term profitability."

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SAREP is currently in the midst of a facilitated, multi-stage strategic planning process aimed at making the best use of our existing resources, and also setting the stage for seeking new funds to expand our efforts. Since July 2000, SAREP staff and I have been developing a draft strategic plan for the next five years that anticipates renewing our existing grants programs and further integrating SAREP support activity into the larger statewide extension effort via new cost- and position-sharing with counties and other campus-based programs. Our statewide stakeholders, represented by our Program Advisory Committee, Technical Advisory Committee and BIFS Advisory Committee, meeting together in October with ANR Assistant Vice President for Programs **Lanny Lund** and Agricultural Productivity Program Leader **Michael Reid**,

have also recently completed a facilitated review of the draft. I feel confident that our strategic plan reflects the concerns and needs of our stakeholders as represented under the specific provisions of the Sustainable Agriculture Research and Education Act of 1986. In concert with the intent of AB 2663, SAREP will continue to seek funds to expand its mission to support scientific research and education in agricultural and food systems that are economically viable, conserve natural resources and biodiversity, and enhance the equity and quality of life in the state's communities. Stay tuned!

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Director's note: In our last newsletter, I shared the results of the Western Region SARE Conference: Farming and Ranching for Profit, Stewardship, and Community held in March in Portland. In listing the co-chairs who worked on program and event planning and proceedings for this important conference, I failed to include co-chair **Mary Staben** of Oregon State University who dedicated many months to budgeting, planning, managing, and evaluating the event. Mary's work clearly shaped the success of the event and led to the important post-meeting impacts I described. Thank you, Mary.— *Sean L. Swezey, director, University of California Sustainable Agriculture Research and Education Program.*

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## Sustainable Ag Partnerships Forum Set

Mark your calendar. On March 27-28, 2001 at the Heidrick Agricultural History Center in Woodland, Calif., SAREP will co-host the forum *Partnerships for Sustaining California Agriculture: Profit, Environment, and Community*. The conference will include discussion by ag leaders in industry, research, policy, and advocacy about successful strategies to increase sustainable approaches.

“This conference will highlight innovations in agricultural production, research and extension, featuring farmer groups and leaders implementing ‘win-win’ practices that are profitable as well as environmentally friendly,” says **Sean L. Swezey**, SAREP director.

Activities include plenary presentations, panel discussions, and practical hands-on workshops. Conference topics include reduced-risk production practices, partnership approaches to enhance the adoption of and support for biologically integrated farming systems, marketing issues in biological farming, and policy issues. Hands-on workshops are being organized in methodologies for evaluating and monitoring biologically integrated farming projects, practical methods for creating and maintaining healthy farmer-research partnerships, policy challenges and opportunities, marketing innovations, soil fertility, and funding opportunities.

Co-sponsors include SAREP, US Environmental Protection Agency Region 9, California Department of Pesticide Regulation, USDA Western Region Sustainable Agriculture Research and Education program (SARE), California Association of Winegrape Growers, California Department of Food and Agriculture, California Integrated Waste Management Board, California Prune Board, Community Alliance with Family Farmers, Lodi-Woodbridge Winegrape Commission, California Agricultural Working Group, and the Almond Board of California.

For more information, see the conference Web site [www.sarep.ucdavis.edu/agpartners](http://www.sarep.ucdavis.edu/agpartners). To register, contact UC Davis University Extension (800) 752-0881. Enroll in section 003AGR104

## Food Security Symposium Links UC, Local Groups

Issues of food security brought experts to the table for a two-day symposium at UC Berkeley Oct. 10-11 that showcased some of the innovative ways local groups are addressing hunger in their communities, while linking them with UC experts working to increase food security on a variety of fronts.

“Achieving food security—adequate, nutritious and locally available food—in California’s communities will require partnerships among nutritionists, agricultural economists, farmers, community health advocates, state agency officials and consumers,” said **Gail Feenstra**, food systems analyst with UC SAREP, a conference co-sponsor. She noted that particular attention was paid at the symposium to strategies for reducing food insecurity that also benefit farmers with small and medium-sized operations.

“UC can help consumers understand the benefits of nutritious, locally produced food, which in turn helps create markets for small farmers,” she said.

The program included opening remarks from **Lucia Kaiser**, co-chair of the Food Security Workgroup in the UC Division of Agriculture and Natural Resources, and **W. R. ‘Reg’ Gomes**, UC vice president-agriculture and natural resources.

“I’m particularly pleased that many of the Division’s programs are working closely with the community to develop innovative approaches to these critical issues,” Gomes told about 75 conference participants.

Other speakers included **Jan Poppendieck**, Hunter College, New York; **James Weill**, Food Research and Action Center, Washington, D.C.; **Kathy Lawrence**, Just Food, New York; **Lucrecia Farfan-Ramirez**, UC Cooperative Extension director, Alameda County; and **Estella West**, UC Cooperative Extension family and consumer advisor, Santa Clara County.

Researchers and advisors with SAREP and Cooperative Extension joined with representatives from Santa Clara Social Services, Contra Costa Department of Public Health, Greenbelt Alliance and other agencies to explore farmer-to-consumer direct marketing in low-income communities; sustainable urban agriculture; the role of education in achieving food security; school gardens; and innovations in food assistance programs. The program also included a food security tour. The UC Food Security Workgroup, which organized the symposium, includes people from UC Cooperative Extension and the USDA. For more information, contact Gail Feenstra at SAREP, (530) 752-8408, [gwfeenstra@ucdavis.edu](mailto:gwfeenstra@ucdavis.edu)

## Staff Project Update

# UC Davis Vineyards Use Cover Crops, Hedgerows

By Robert L. Bugg, SAREP

UC Davis vineyards are going under cover, but this does not imply that they are becoming less conspicuous. Since the fall of 1998, they have been planted with a range of different perennial and annual grasses, clovers and wildflowers to revitalize the vineyard understory.

The addition of cover crops is due to vineyard manager **Richard Hoenisch** and his field staff, who have made changes to the sites in consultation with SAREP staff member **Robert Bugg**, **Chuck Cambra** of Kamprath Seeds in Manteca, and **Scott Stewart** of Stewart Conservaseed in Elk Grove.



Late spring: Mixture of non-native perennial grasses used as cover crop in UC Davis vineyards. (photo by Robert L. Bugg)

Located along the Putah Creek Preserve west of the main

campus, the UCD vineyards were ablaze with golden California poppy, blue lupines and phacelia, yellow tidy tips, pink Persian clover, scarlet crimson clover, and magenta redmaids during the spring of 2000. Currently, 52 of the total 140 acres are under some sort of cover-cropping regime; another eight acres are being added in the fall of 2000.

“Cover cropping is just part of our overall commitment to managing bio-responsibly,” Hoenisch says. Trained at UC Davis where he received a doctorate in plant pathology, Hoenisch previously managed private vineyards in Hopland and Paso Robles. The vineyards’ riparian zone supports many native plant and wildlife species, according to Hoenisch.

“Rather than relying on tillage and pre-emergence herbicides, we’re using cover crops and hedgerows to keep our soil from eroding and provide foraging habitat for Swainson’s, marsh, and red-tail hawks and other predators,” Hoenisch says. He says the vineyards are on very deep, highly fertile soils, which sometimes results in excessive vigor for winegrape varieties.

“We’re using drip irrigation, close vine spacing, and cover to reduce vigor and enhance quality,” he says.

## Grasses

Hoenisch notes that perennial grasses used as cover crops are very good at

improving access, particularly during wet springs.

“The perennial sod-forming and bunch grasses are like walking on a carpet for the workers, a benefit often understated,” he says. “There is much less dust on the fruit in vineyards with perennial grass cover crops.”

Hoenisch says some growers and managers are hesitant to use cover crops because they are concerned with vineyard appearance.

“Cover crops look great most of the time, except during the late spring and early summer when they go to seed. But we like to accommodate the cover crop biology by delaying our mowing until seed is mature. This whole project has been done on a shoestring budget so far, and self-reseeding cover crops save us money,” he says.

Traps are used to combat gophers in the vineyards, according to Hoenisch. “The raptor population including the hawks, barn owls and blue herons help us out, too,” he says. The vineyard staff has constructed five owl boxes to attract owls, and the local riparian habitat encourages the raptors.

### **Hedgerow project**

The UC Davis vineyards are hosting a research project on insectary hedgerow plants designed by **Danielle LeGrand**, a weed science graduate student in the Department of Vegetable Crops.

“Danielle’s project addresses our need to develop border plantings to harbor desirable wildlife,” Hoenisch says. “Naturally we are concerned about the arrival of the glassy-winged sharpshooter, and screening and continued monitoring of prospective landscape plants for host status are high priorities. But we don’t want to overreact by excluding non-crop vegetation altogether.”

In fall 2000 Hoenisch and staff are adding culinary and medicinal herbs to vine row ends and to vineyard entrances, many in the UC colors of blue and gold. The spectacular fields of California poppies and lupines that once dominated much of the state landscape are the inspiration for the official UC colors.

### **Plans for wetland**

Hoenisch and Bugg are applying for grants to implement other aspects of Hoenisch’s plan, including establishing a mini-wetland planting around the drip irrigation sump, and the addition of raptor and bat nesting boxes.

“Cover cropping and most of these other options are well-established in the industry, but by no means universally understood or practiced,” Hoenisch says. “It’s hard to overestimate the educational value of having such techniques in place on UC lands. Students, faculty, tourists — everyone who uses or visits the vineyards — can see that the techniques work.”

Hoenisch and Bugg have given eight joint presentations to visiting groups of students and vineyardists through the fall of 2000.

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## Project Update

# Ornamentals, Grapes & Orchards: Working on Alternatives to Methyl Bromide

By Lyra Halprin, SAREP

Cut flowers and bulbs, grape rootstocks and orchard replants are the focuses of three of the seven SAREP-funded projects seeking alternatives to the agricultural fumigant methyl bromide. The three projects are funded with the 1998 special allocation from the state legislature promoting the development of alternatives to methyl bromide (AB 1998) sponsored by Assemblywoman



Replant disorder caused poor vigor in this peach orchard in Southern San Joaquin Valley. (photo by Greg Browne)

**Helen Thomson** (D-Yolo County) and funded through the Department of Pesticide Regulation.



Researchers are growing peach seedlings in soil from replant sites to test for pathogens associated with replant disorder. (photo by Greg Browne)

“The planned phase out of methyl bromide, which is often used as a preplant fumigant to eliminate nematodes, weeds and pathogens in many ag production systems, will hit California growers hard over the next few years,” says **Sean L. Swezey**, SAREP director. “The chemical is a Class I ozone depleter, which is scheduled for 100 percent use reduction in this country by 2005.”

More than 500,000 pounds of methyl bromide were applied to nursery flowers and floral greens in California in 1998 according to the Department of Pesticide Regulation’s Pesticide Use Reports.

Growers used 1,116,000 pounds of the product on grapes, and applied 1,380,000 pounds on almonds, nectarines, peaches, plums and prunes in the same year, according to the Pesticide Use Reports and further analysis of the soil fumigation data which

applies to perennials in Fresno and Tulare counties.

## Orchard Replant Disorder Project

Researchers in the plant pathology department at UC Davis, the USDA-Agricultural Research Service (ARS) in Davis and Fresno and farm advisors in Fresno, Tulare and Butte counties are trying to reduce dependence on methyl bromide fumigation in almonds, nectarines, peaches, plums and prunes

(*Prunus spp.*). The goal of their collaborative project is to help reduce dependence on methyl bromide fumigation for control of replant disorder (RD), which causes poor and irregular tree growth, delays economic production, and in severe cases leads to tree loss in young orchards.

“RD can occur when trees or vines are planted without special precautions at sites previously planted to a closely related crop,” says principal investigator **Greg Browne**, research plant pathologist for the USDA-ARS in the plant pathology department at UC Davis.

There are thought to be many causes of RD including attack by parasitic nematodes, oak root fungus, or *Phytophthora*, but some key causes remain unknown, as it can occur in the absence of these known pests and pathogens. Browne and co-principal investigators **Tom Trout**, supervisory agricultural engineer at the USDA-ARS water management research lab in Fresno, and **Russ Bulluck**, visiting postdoctoral scholar at UC Davis, are trying to determine other unknown organisms or factors that contribute to RD and devise improved approaches to its management.

“We believe an improved understanding of the origins of RD may be one of the most important keys to developing methyl bromide alternatives,” Browne says.

The investigators and their ARS colleagues based in Parlier, Fresno County, are also testing the potential impacts of the amount of time a field lies fallow, the use of cover crops, and previous crop history on RD occurrence and severity. Browne notes that improved basic knowledge of the causes of RD will help with the development of new management strategies, and data on the impacts of fallowing and cropping patterns will help growers assess risk and develop the most favorable replant schedules.

### **Effects of Preplant Fallow Periods**

Peach replant field trials are underway at the USDA-ARS research farm in Parlier to determine effects of preplant fallow periods and chemical alternatives to methyl bromide on RD. The previous orchards at the Parlier experimental replant sites were farmed using conventional commercial practices until removal. Replanting for the first trial began in March 1998.

Fallowing (leaving fields barren) and crop rotation can provide suppression of plant diseases. Without suitable hosts, soilborne pathogens gradually decline.

“Four years of dry fallowing prior to replanting may be sufficient to avoid most of the replant problem in California,” says Trout, who is managing the Parlier experiment sites. “Unfortunately, that length of fallow is usually not economically feasible. Almond, peach and plum growers in the San Joaquin Valley usually choose between four-month and 16-month fallow periods before replanting the same crops, and more information on how much replant disorder control that provides is needed.”

The project treatments included a 17-month fallow period, begun in September 1996, and a five-month fallow period begun in September 1997. Additional treatments included applications of methyl bromide, and an alternative chemical standard, Telone plus Vapam. Trial 2 began in February 1999. Preplant procedures were similar.

According to Trout, growth measurements to date suggest that a 17-month fallow period rather than a five-month fallow period between tree removal and replanting will improve early tree growth in some, but not in all cases.

“It is noteworthy that first season trunk diameters in non-fumigated plots of the first trial were similar to those in fumigated plots in the second trial,” says Trout. “This suggests that environmental factors other than the treatments played an important role in the rate of replant tree growth.”

Additional experiments regarding the effects of preplant fallowing are underway, he says.

## Effects of Preplant Cover Crops

Although results are not yet available, the project has begun three replicated cover crop experiments, each with soil from a different replant site at the Parlier fields.

“The hypothesis is that growth of some cover crops during the period between old orchard or vineyard removal and new tree or vine planting may shift the soil microbial community and reduce the severity of RD,” Browne says.

In the summer of 1999, the investigators collected soil from replant sites in one peach orchard and one plum orchard where the trees had been removed the previous fall. In the former peach orchard, the soil collection sites included methyl bromide-fumigated and non-fumigated plots, but in the plum area, none of the collected soil had been fumigated.



Peach seedlings planted in cones containing replant soil that is being tested for the presence of pathogenic organisms. (photo by Greg Browne)



Researchers are trying to determine if cover crops grown during the period between old orchard removal and new tree planting change soil microbial communities and reduce severity of replant disorder. Cover crops are being tested in greenhouse experiments with soil from replant sites. (photo by Greg Browne)

Ten cover crops were germinated and transplanted into the potted samples of soil from the replant sites. Additional potted portions of the soil were subjected to dry or moist fallowing without fumigation or cover crops, or moist fallowing followed by methyl bromide/chloropicrin fumigation. After four months of growth, the cover crops were uprooted, chopped, incorporated into the soil and allowed to decompose for two months. The soil samples were replanted with Nemaguard peach

seedlings; effects of the preplant treatments are being assessed regarding shifts in microbiological soil populations and the growth and root health of the replants.

## **Cross-specificity between Peach and Grape?**

Growers intending to plant peaches or related crops on land previously devoted to grapes, or growers shifting land from peach to grape production are concerned about the degree of specificity between peach and grape replant disorder.

“So far, results from soil samples from fields previously planted to peach and grape have provided no clear evidence for cross-specificity between peach and grape replant disorder,” Browne says. Regardless of whether the soil was collected from an old vineyard site or an old peach orchard site, preplant heating and/or fumigation usually resulted in greater peach and grape seedling root or shoots weights and reduced the severity of root discoloration.

Favorable responses to heating were more pronounced for grape than for peach, Browne says. For grape, fumigation alone usually was not as effective as preplant treatments involving heat. He also notes that there were no significant interactions between the soil source and the seedling type.

“Our results should be repeated and confirmed with field observations before application to commercial situations,” Browne says.

## **Organisms that Cause RD**

Browne notes that although it is not certain that all RD problems are caused by soil microorganisms, positive results from using preplant soil fumigants like methyl bromide suggest that a biological origin should be explored. One approach to identifying microbes that cause the disease is to impose heat or chemical treatments that will “fractionate” soil microbe populations by killing or suppressing some of them, leaving a less complex mix of pest or pathogen candidates.

Several heat fractionation experiments were completed in a greenhouse with soil from peach and almond replant sites near Parlier, and in Chico, Butte County. For the experiments, soil samples were heat-treated in water or autoclaved. Heat treatments consistently reduced the severity of root problems.

Researchers also conducted a chemical fractionation experiment using preplant soil treatments of antibiotics, fungicides, a nematicide and a non-treated control on either autoclaved or non-autoclaved samples of the replant soil. Nemaguard peach seedlings grown in the non-autoclaved, non-chemical-treated soils developed root discoloration symptoms, while those grown in autoclaved soil had healthy roots. Among the seedlings grown in non-autoclaved soil, one of the fungicides significantly reduced the severity of root discoloration suggesting fungal involvement in the symptoms, Browne says.

Organisms associated with symptoms of root discoloration in the fractionation tests on RD-affected trees in the field have been isolated and are being tested for their ability to cause disease on peach roots. Browne says that although several fungi are RD suspects, no new conclusions on causes can be made yet.

## **Almonds, too**

**Joe Connell**, Butte County farm advisor, is working with Browne on the segment of the project related to almond replant disease.

“My part of the project is just getting underway, so we don’t have any results yet,” Connell says, “But we do have a big problem with replant disease.”

Connell and Browne are conducting replicated trials in a Chico area orchard, comparing the success of untreated plots with different rootstocks, and with plots fumigated with either methyl bromide, Telone/chloropicrin, or chloropicrin alone. They are hoping to identify pathogens that cause the almond replant problem, and are looking for effective preplant treatments.

## **Growers Count on Science**

“When it seems like we’re faced with a disaster, like the elimination of methyl bromide, it motivates change,” says **Rod Riffel**, farm manager for Enns Packing in Kingsburg, which grows peaches, plums, apricots, and nectarines. “There’s a lot of hope out here that biological alternatives, chemical alternatives, fallowing or a combination of these may provide a better situation for replanting than we’ve been using.”

Riffel is glad nursery operators, plant breeders and other researchers are developing stronger, more resistant rootstocks, and is excited about research being done with microbial inoculants.

“Microbial inoculants and their effect on root health, particularly in their relationship to pathogen and nematode antagonism, is very interesting,” Riffel says. “I’m happy to be working with Tom Trout and Greg Browne on the different trials. Their open-minded, practical and thorough approach to exploring the possibilities will help us find the best options.”

Riffel says that biological controls will be much welcomed. “We look at biological controls first,” he says. “That’s just our approach.”

**Ken Enns**, a family partner in Enns Packing, is hoping for scientific breakthroughs.

“The bottom line for me right now is that we must rely on science and/or politicians to come up with a viable means to fumigate,” he says. “For our family, we need to fumigate land when we replace our permanent crops, and we need fumigation for post-harvest treatment on stone fruit. We currently use methyl bromide on about fifty or less acres per year and we do well over 100 chamber fumigations per summer for export purposes.”

“Methyl bromide gives us the best protection against some of the organisms in the soil right now,” says **Gary Van Sickle**, research director at the California Tree Fruit Agreement. “As we lose methyl bromide, we could lose 15 to 30 percent of our potential yields, in stunted growth and reduced crop loads on trees. That’s tough for farmers. The market for fruit hasn’t gone up that much in the last 20 to 30 years. The only way we can overcome low farm prices is to increase efficiency and yields. That’s the only way we can squeeze out profits. As we lose this chemical tool, we’ll go backwards.”

Van Sickle notes that tree fruit varieties are becoming obsolete very fast.

“Plant breeders are putting out new varieties with improved yield so quickly now that farmers are replanting 10 percent of their field each year and have

about 20 to 30 percent of their fields out of production during any given year,” he says. “If they had to leave their land fallow for three years to avoid RD, some would have 50 percent out of production annually.”

Researcher Browne is aware that the loss of methyl bromide as a tool is a serious one for the agricultural community.

“We all appreciate the valuable cooperation and input we’ve received from growers, other ag representatives and businesses, and UC Cooperative Extension,” he says. “In light of the phase-out of methyl bromide, we all hope the project’s efforts will lead to improved cultural management practices for replant disorder.”



*Range of responses to dagger nematode damage on grape seedlings ranging from resistant(left) to very susceptible(right). (photo by Yimin Jin)*

## Grape Rootstock Project

Methyl bromide is commonly used as a preplant fumigant for vineyard establishment in the San Joaquin Valley, and Central Coast valleys. Its phase-out will present California grape growers with a critical problem: lack of suitable rootstocks with nematode resistance. This problem will be particularly severe where new vineyards are replanted over a previous vineyard. Available rootstocks may not have the right horticultural characteristics for all situations or they have insufficient resistance against aggressive nematode strains and species.

UC Davis nematologist and professor **Howard Ferris** and **Andrew Walker**, associate professor in the UC Davis viticulture and enology department, are evaluating grape rootstocks for resistance to two major nematode pests: the dagger nematode and standard and aggressive strains of the root-knot nematode.



*Researchers sample vegetation at dagger nematode and Phylloxera resistance rootstock trial in Napa Valley. (photo by Andrew Walker)*

“Fumigation has a place in vineyards with high nematode populations and where growers are using less than fully resistant rootstock, but we have seen very little impact when fumigation is used to control *Phylloxera*,” says Walker, whose specialties include grape breeding and genetics.

“We see the same result in the case of fanleaf degeneration vectored by the dagger nematode,” he says. “Fumigation has little utility in controlling the problem because it cannot penetrate the soil deeply enough to kill all the

nematodes, and the remaining ones continue to infect roots and vector virus.”

Ferris says approximately 45 selections from crosses made with wild grape relatives have been screened against the root-knot nematode. These selections have previously shown resistance to the dagger nematode. Of those tested, 23 were also resistant to the root-knot nematode. Seventeen selections from wild grape crosses have also been tested for root-knot nematode resistance; six exhibited resistance.

A set of 33 selections, which previously tested resistant to root-knot nematode, is in the final stage of screening for resistance to the dagger nematode.

“We’re building up population levels of three root-knot nematodes populations that are aggressive on the Harmony rootstock, a major nematode-resistant rootstock used by wine grape growers,” Ferris says.

Then, he says, promising rootstocks will also be challenged by both dagger and root-knot nematodes.

“So far our project results have been productive,” Ferris says. “We’ve overcome some challenges related to expanding our program and using borrowed greenhouse space, and developing appropriate cultivation practices for the rootstock selections we are testing.”

Ferris notes that the ultimate benefits of this project will be gauged by the use of the rootstocks that are developed.

“Currently available rootstocks have viticultural flaws like excessive vigor, or they lack effective resistance,” Ferris says. “There is an excellent chance that our ongoing research will produce better rootstocks, and when it does, that they’ll be accepted and used.”

Most of the extension and outreach activities of this project will occur during and after the third year, according to Ferris. At that point, rootstock trials will be set up with farm advisors and growers in the North Coast focusing on grapevine fanleaf virus areas, the northern San Joaquin Valley with an emphasis on pressure from root-knot nematodes and grapevine fanleaf virus, the Central Coast for root-knot nematodes, and the central and southern San Joaquin Valley for root-knot nematode complexes, lesion nematode, and citrus nematode.

“We’re hoping that data from field trials could result in recommendations on the use of new rootstocks in as few as five years,” Ferris says.

## **Grower Hopes**

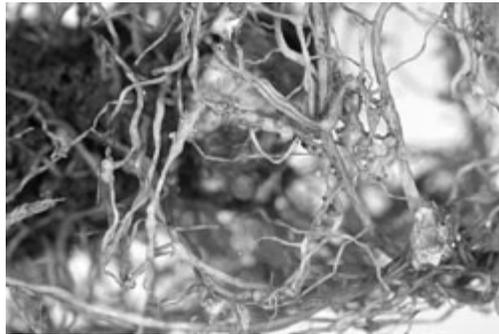
**Martin Mochizuki**, of Walsh Vineyard Management in Napa, is cooperating with Walker in a Beaulieu Vineyards test plot near Rutherford.

“I really like the idea of resistant rootstock,” Mochizuki says. “That’s

what we're hoping for. Otherwise, when you plant new vines, they struggle. Letting the winegrape land go fallow is not really economically feasible here, so we've been fumigating. We're hoping to fumigate and replant any older vineyards in heavy fanleaf-infested areas before methyl bromide is phased out. We hope before we have to replant again in 15-25 years, there will be more fully resistant rootstocks. Right now we're using the 03916 rootstock, which is somewhat resistant. It can pick up fanleaf, but the disease isn't expressed in the fruit."



Xiphinema index, the largest plant parasitic nematode, a major problem in grape rootstocks. (UC Davis Plant Pathology photo)



Egg masses of root-knot nematode on grape rootstock. Researchers are evaluating rootstocks for resistance to this major grape pest. (photo by Peter Cousins)

## Coastal Ornamental Crops Project



Researchers are testing solarization and broccoli residue as alternatives to methyl bromide in fields planted to callas like these near Monterey. (photo by Golden State Bulb Growers)

Cut flowers, bulbs and greens are highly productive and valued components of California's ornamental crops industry, which is seriously threatened by the pending loss of methyl bromide. Since solarization alone does not create enough soil heating to be effective at killing fungi, bacteria and weeds in the coastal regions, researchers at UC Davis are combining solarization with the addition of organic amendments to stimulate the phenomenon of bio-fumigation. Their project is focusing on controlling the soil-borne fungus *Fusarium oxysporum*, the soil-borne bacterium *Erwinia carotovora* and several weed species. Microplot experiments are being conducted in several locations; in-field experiments are taking place with two different bulb crops, Dutch iris and calla.

**James MacDonald** of the UC Davis plant pathology department and **Clyde Elmore**, of the UC Davis vegetable crops/weed science department are working with **Steve Tjosvold**, a UC Cooperative Extension farm advisor in Watsonville specializing in horticulture.

In the first year of the project, researchers started laboratory and greenhouse studies to determine the effects of broccoli residues on the survival and growth of selected fungal pathogens.

"Broccoli residues release isothiocyanate upon decomposition, which has been an effective fungicide," MacDonald says. "We wanted to quantify the fungicidal effects."

Researchers collected leaf and stem tissues of mature broccoli, which were macerated (ground up) in food processors and placed in culture dishes with fungi. A similar set of experiments was done in which the macerated material was mixed with soil.

“Our experiments showed that volatile materials released from macerated broccoli significantly reduced radial growth of the fungi we tested,” MacDonald says. “We also noticed that fungal inhibition was generally enhanced at higher soil temperatures.”

Additionally, field experiments were done at four locations: UC Davis (as a Central Valley location where solarization would be maximized), 3-Way Farms in Royal Oaks/ Watsonville, Watsonville Nursery, and the Monterey Bay Academy. The three Monterey sites were chosen for variation in climate; the Monterey Bay Academy site is several hundred yards from the ocean, while the other sites are several miles inland.

The general methods employed in all experiments involved burying small packets (polyester sachets) of soil containing known populations of the fungus in test plots prior to treatment. At one site, packets containing pieces of potato colonized by soft rot bacteria also were buried. Additionally, bulbs of gladiolus or calla were buried, along with soil temperature sensors. Bulbs of previous crops are significant weed problems for cut flower growers.

The following treatments were used in field experiments: no treatment (control), clear polyethylene for various lengths of time, clear polyethylene over water bags for six weeks (heat retention), various concentrations of Metham sodium, blood meal and solarization, composted chicken manure with and without solarization, corn gluten meal with and without solarization, acetic acid and solarization, ammonia and solarization, and broccoli chop with and without solarization.

At the conclusion of each field experiment the sachets containing fungi, those containing bacteria and the bags of flower bulbs were recovered to assess post-treatment survival. The stands of native weeds in each plot were also quantified to determine treatment efficacy.

Evaluations of harvested plots have been essentially completed, MacDonald reports. Researchers compared soil temperatures at different depths and with different treatments, the survival of several fungi at different depths and with different treatments, weed germination/survival with different treatments, bulb survival with different treatments, and bulb infections following different treatments.

In comparing the soil temperatures achieved through solarization, MacDonald says the degree hours accumulated in the three Watsonville-area plots were substantially reduced compared to the Davis plots.

The Monterey Bay Academy site never achieved soil temperatures of 40°C, he says. The soil temperatures achieved through solarization were insufficient to reduce germination of calla bulbs relative to controls at that site.

“This was important to determine, as growers consider residual bulbs from previous crops to be one of their greatest weed problems,” says Tjosvold.

Tjosvold reports that excellent control was achieved at all experimental sites with Metham sodium (100 gal/acre) overlaid with plastic tarps for six weeks. Good control also was achieved when broccoli residues were incorporated at the rate of five tons/acre (dry weight basis) in the top three inches of soil, and

overlaid with plastic tarps for six weeks. Broccoli residues without tarping had no effect, he says.

“We think the beneficial effect of tarping was related to trapping of volatile materials within the soil rather than a solarization effect,” he says.

Calla bulbs were recovered from the plots at the end of the treatment periods and were assayed to detect the presence of two fungi species; both were present.

“While these results were entirely qualitative, they did indicate that these microbes could survive, at least to some extent, in the presence of these soil treatments,” Tjosvold says.

In experiments in which sachets of infested soil were buried in plots prior to treatment, and recovered after treatment to compare survival, researchers found that the results at Davis differed greatly from the Watsonville sites. At Davis, all treatments (except composted chicken manure alone) caused significant reductions in fungi populations. At the Watsonville Nursery site, there was no statistically significant difference between any of the treatments and the controls with respect to fungi survival. However, at the Monterey Bay Academy site, Metham and tarping resulted in a significant reduction in one fungus population relative to the control at the 5-cm depth. At this same depth, the survival of a second fungus species was lowest in the broccoli residue treatments, but Tjosvold says the results were highly variable and no statistically significant results were obtained.

During the summer of 2000 researchers repeated experiments with Metham and broccoli residues.

“These were the treatments that appeared to warrant further research based on our first-year results,” MacDonald says.

“Growers of cut-flower crops will be especially hard-hit by the loss of methyl bromide, and larger, field-scale experiments will give a better indication of the cost effectiveness of these alternatives,” he says.

MacDonald reports that the results of this research will be disseminated through presentations at the annual Methyl Bromide Alternatives conference, the California Ornamental Research Foundation tours and newsletters, and through the California Cut Flower Commission.

## Grower Concerns

**Eric Overeem**, farm manager, pest control advisor and certified crop advisor at Golden State Bulb Growers in Santa Cruz and Monterey counties, says that the loss of methyl bromide as a preplant fumigant will hit their industry hard.



Golden State produces calla bulbs (*Zantedeschia spp.*), predominantly

Snapdragon and godetsia seedlings were planted in UC

for the smaller colored flowers that range from yellow to purple to red and multicolored, and the traditional larger-sized white flowers. The vertically integrated operation grows and sells the bulbs.

Davis test plots after six weeks of solarization with tarps(left) or the incorporation of 35 tons of fresh broccoli (right) for weed control. (photo by Clyde Elmore)

Overeem says one of the problems for his operation is that they can't cultivate or use dust mulch ("dirt smothering") to reduce weeds. The plants are 1 1/2 to 3 inches apart; tools for cultivation or mulching would damage them.

"We've also used methyl bromide to kill volunteer callas, because they are sources of disease inoculum and are reservoirs for viruses," Overeem says.

Overeem says Elmore's broccoli residue combined with solarization did suppress volunteers on one of Golden State's fields, but he doesn't think it's economical yet for their operation.

"We have a very short window of opportunity to plant in the spring," he says. "If I had to solarize for six weeks, I'd be out of business. We need to maximize the amount of growth we develop the first season or we don't get salable bulbs the following season. It's an 18-month crop."

"Until there are more economically feasible alternatives, we see using more chemicals to achieve the same result we got with methyl bromide," he says. He anticipates using Telone and chloropicrin for base fumigation. "And then we'll have the weeds to deal with," he adds.

Overeem says the post-methyl bromide regime will include a more extensive herbicide program and/or more expensive hand weeding.

"As far as disease control, I anticipate having to spray more frequently," he says. "I might end up putting more pounds and more types of toxins in the environment than I would have with methyl bromide."

"We've grown broccoli as a cover crop before, but didn't see much pest-suppressing effect," he says. "In theory, it sounds great, but the logistics make it complicated."

**Pat Treffry**, general manager at 3-Way Farms based near Watsonville in Royal Oaks, is very concerned about the phase-out of methyl bromide, particularly because undeveloped countries have a longer time frame in which to accomplish it. U.S. farmers must stop using methyl bromide by the year 2005, while undeveloped countries have until 2015. The gradual phase-out has also meant a dramatic increase in the price of methyl bromide.

"The cost went up 40 percent this year," Treffry says, noting that the price will increase again each year the phase-out of the chemical requires a reduction in use.

In the meantime, floral greens producers like Treffry are looking for alternatives for postharvest pest control and soil fumigation.

"The solarization and the tarps would be so terrific in the Central Valley with that heat," Treffry says, commenting on one of Elmore's polyethylene tarping and broccoli trials, which took place on a 3-Way field. "It's harder to see them

being effective here when the sun might not break through until after 11 a.m.”

He says, however, that the solarization methods might be very useful on 3-Way’s farm in the Central Valley community of Los Banos, where they raise German statice, caspia and larkspur seeds.

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## Biotechnology Lecture Series at UC Davis

A major public lecture series, *Biotechnology, Policy, and Society*, is bringing 10 internationally recognized experts to the University of California, Davis to explore what modern biotechnology means to society. The series began in October and continues through early March.

Biotechnology has stimulated public debate over the potential benefits and risks of these new technologies as applied in food and fiber production, medicine and manufacturing.

“Intentionally or not, by adopting new technologies we make choices about the future,” says **John Hall**, a UC Davis sociology professor and director of the campus’s Center for History, Society, and Culture, which organized the series. “The series is meant to provide a forum for public discussion of the issues, based on the best information available.”

**Jenny Broome**, SAREP associate director, served on the committee which recommended the speakers.

The first lecture featured **James Cook**, of Washington State University and **Rebecca Goldberg**, of Environmental Defense. The first November lecture featured **David Botstein**, from the genetics department at Stanford University and **Brian Wynne**, of the Centre for Science Studies, Lancaster University, United Kingdom. Other speakers include:

- Nov. 30: **Peter Kareiva**, National Oceanic and Atmospheric Administration, “Ecological Risks and GMOs: How Science, Government and Policy Makers, and Language Fail Us”; and **Arthur L. Reingold**, Division of Public Health Biology and Epidemiology, UC Berkeley, “Can Epidemiologists Detect Adverse Effects of GMOs on Human Health?”
- Jan. 18: **Rebecca Nelson**, International Potato Center, Lima, Peru, “Gene Flow and Information Flow: On Biotechnology and Sustainable Food Production in Poor Countries.”
- Feb. 1: **Rebecca Eisenberg**, School of Law, University of Michigan, “Is the Patent System Ready for the Genome?”
- Feb. 15: **Walter W. Powell**, School of Education and Department of Sociology, Stanford University, “Universities as Creators and Retailers of Intellectual Property.”
- March 1: **Richard Lewontin**, Department of Organismic and Evolutionary Biology, Harvard University, “The Struggle Over Biotechnology, the Last Stage in a Cultural War.”

The free lectures are being presented at 7:30 p.m. in the Alpha Gamma Rho Room of the Buehler Alumni and Visitors Center. For more information, see the Center for History, Society, and Culture’s Web site at:

<http://chsc.ucdavis.edu/Main-aboutCHSC.html>.

Additional support for the lecture series was provided by the UC Davis Office of the Provost, the College of Agricultural and Environmental Sciences, the Office of University Outreach and International Programs, and the Social Science Division of the College of Letters and Science.

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*Techincal Reviews*

## **Sustainable Vegetable Production from Start-up to Market**

*Vernon P. Grubinger*

Natural Resource, Agriculture, and Engineering Service (NRAES), Ithaca, New York. 1999

This handbook is one of the best resources available on developing and managing a successful commercial vegetable farm. Many books and manuals have been published on how to grow specific vegetable crops; few cover the range of topics, issues and questions addressed in this book. It provides practical, how-to information on the interrelated systems that comprise a vegetable farm, and addresses the management of money, people, and natural resources.

The book was an outgrowth of a course taught by the author while on sabbatical leave at the University of Vermont. The primary audience for the book is the growing number of farmers who are pursuing a middle path between small-scale, organic production and large-scale, chemical-intensive farming. Many of these producers are managing moderate-sized operations and are interested in sustainable farming practices, using as few chemical inputs as possible, with an emphasis on direct marketing.

The book opens with a discussion of terminology and the different approaches to farming that have emerged over the last 20 to 30 years. The author distinguishes between sustainable agriculture, organic farming, and integrated crop management and stresses the importance of ecological, economic and social connections as a means to achieving a successful farm and business. Subsequent chapters provide information for beginning or aspiring vegetable farmers including how to set personal goals, evaluate enterprise ideas, obtain practical experience, locate a place to farm, and determine equipment needs. The fundamentals of managing a farm business and finding a market for the produce are also discussed. Together, the opening four chapters provide an important foundation and context for the remainder of the book which looks at production practices from soil preparation to harvest. Key topics covered include soil fertility management, on-farm composting, crop rotation, cover crops and green manures, tillage equipment and field preparation, seeds and transplants, irrigation and spraying systems, harvest and postharvest handling, season extension, and integrated pest management for insects, diseases, and weeds.

The final chapter of the book profiles the actual experiences of 18 vegetable growers from six different Northeast states. They are presented as “real-life examples of how farmers think about and deal with specific conditions.” Although the growing conditions and markets reflect the situation in the Northeastern U.S., much of the information included in these profiles will be of interest to growers in other locations. Brief enterprise budgets outlining the

major costs and estimated revenue for a number of vegetable commodities are also provided.

*Sustainable Vegetable Production from Start-up to Market* is 265 pages, with 91 figures and 20 tables. It is available at a cost of \$42 (plus shipping and handling) from the Natural Resource, Agriculture, and Engineering Service (NRAES), (607) 255-7654, [www.nraes.org](http://www.nraes.org). Request publication NRAES-104.

The author has also produced a video with profiles on the alternative marketing strategies of seven different farming operations in the Northeast U.S. With segments on a farmers' market, community supported agriculture, Internet sales, a U-pick operation, restaurant sales, and a wholesale cooperative, the video is an excellent companion to *Sustainable Vegetable Production*, providing additional details on marketing that are not included in the book. The video is available through the Center for Sustainable Agriculture at the University of Vermont, email: [susagctr@zoo.uvm.edu](mailto:susagctr@zoo.uvm.edu).

*For more information: V. Grubinger, University of Vermont,*  
[vernon.Grubinger@uvm.edu](mailto:vernon.Grubinger@uvm.edu)

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Contributed by David Chaney

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Technical Reviews

## Effects of Biodynamic Preparations on Compost Development

L. Carpenter-Boggs, J.P. Reganold, and A.C. Kennedy

Biological Agriculture and Horticulture 17:313-328. 2000

Biodynamic (BD) agriculture is based largely on scientist-philosopher Rudolf Steiner's recommendations, including the use of herbal preparations that purportedly enhance compost quality. There are doubts among some scientists as to the value of BD practices. Furthermore, past studies have been criticized for possible researcher bias, lack of necessary experimental controls, and publication through non-refereed venues.

The present replicated (r=5) study compared composting processes and products obtained with vs. without BD herbal preparations 502-507. These preparations are, in numbered sequence, derived from yarrow blossoms (*Achillea millefolium*), chamomile blossoms (*Matricaria recucitata*), stinging nettle shoot (*Urtica dioeca*), oak bark (*Quercus robur*), dandelion flowers (*Taraxacum officinale*), and valerian extract (*Valeriana officinalis*).

Compost raw material was dairy barn waste, comprising manure and pine shaving bedding, with initial carbon-to-nitrogen ratio (C:N) of 55 to 60:1. Mean water content of the starting compost was 70 percent. Each of 10 compost piles measured approximately 2 x 2.5 x 1.5 m, with mean mass approximately 3.5 metric tons. Five of the piles were randomly assigned to receive the BD preparations, and five control piles remained. The preparations were applied as prescribed by BD practitioners, at concentrations of approximately 1.1 mg preparation per kg of compost. The piles were not turned, but were allowed to develop for eight weeks.

During the eight weeks, BD compost had significantly and consistently higher mean temperature at 55-60 cm depth. The pH was significantly lower in BD compost near the end of the eight-week period. The 24-hour redox change, respiration (CO<sub>2</sub> evolution per hour), and dehydrogenase enzyme activity were not statistically different for BD compost.

After eight weeks of development, BD compost had a significantly higher ratio of dehydrogenase-to-CO<sub>2</sub> and higher concentration of nitrate, but no significant differences in final carbon percentage, C:N, ammonium concentration, available phosphorus, available potassium, cation exchange capacity, or cation exchange capacity per unit carbon.

Phospholipid fatty acid profiles, used to distinguish soil microbial complexes, showed that BD compost had a higher indication of bacterial and a lower indication of fungal activity than did control compost.

One point of contention regarding BD practices is the use of such small amounts of the preparations. Carpenter-Boggs et al. noted that bioactive compounds (e.g., plant hormones) often show activity at concentrations below those used for the addition of BD preparations. The four medicinal plants used in the preparations (yarrow, chamomile, stinging nettle, and valerian) are known to contain a variety of bioactive compounds, which might be present in the BD preparations and act at low concentrations. The authors also consider that the BD preparations may have served as microbial inoculants, accelerating the composting process and otherwise altering the dynamics.

*For more information: L. Carpenter-Boggs, USDA-ARS North Central Soil Conservation Research Lab, 803 Iowa Ave., Morris, MN 56267.*

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*Contributed by Robert L. Bugg*

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**Resources:**

**Farm Spreadsheets**

*Market Farm Forms: Spreadsheet Templates for Planning and Organization Information on Diversified Farms*, 95 pages plus diskette, June 2000, **Marcie Rosenzweig** with **Bill Kay-Blake**, Full Circle Organic Farm. This package is designed to track information on market farms. It can be used with any spreadsheet software; once farm data is entered, the embedded formulas do the calculations. Written by an Auburn, Calif. farmer to use in her own operation, it begins with a whole farm plan and follows the flow of information from seed through harvest and back to the next season's seed. The publication's soil amendment template allows users to input their own soil test data to calculate what's needed for vegetable crops. Information allows growers to compare projected yields and sales against what actually occurs. Other templates are designed to compare one marketing outlet to another, and to help community supported agriculture (subscription) farmers calculate how much to plant based on the number of shares served. The cost of the publication/diskette is \$45 plus \$5 shipping and handling (Calif. Residents add \$3.26 tax); check, money orders or purchase orders (U.S. dollars) are accepted. For order forms and information on multiple copies contact Marcie Rosenzweig at Full Circle Organic Farm, 3377 Early Times Lane, Auburn, California, 95603-7900; Tel: (530) 885-9201; or call first for Fax activation; Email: [fullcircle@jps.net](mailto:fullcircle@jps.net)

## **Resources**

### **New SAREP Searchable Database**



A new searchable database of information on competitive grants funded by SAREP is now available online. Since its inception in 1987, SAREP has funded 263 projects totaling \$6.8 million, addressing topics and questions of importance to farmers, ranchers and communities across California. Projects in the database include both basic and applied research, education and demonstration programs of research-based technologies and systems, and projects that support the development of community food systems and policies that enable farmers to make the transition to more sustainable food and farming systems. The database can be searched by topic, commodity type, research location, relevance to organic farming, and principal investigator. It also has full text search capabilities. The project summaries contain information that will be useful to producers, community groups, researchers, educators and policy makers across the state. The database is available via the SAREP Web site at [www.sarep.ucdavis.edu/grants/database/](http://www.sarep.ucdavis.edu/grants/database/) Bookmark it now!

## **Calendar**

### **\* SAREP WEB CALENDAR**

SAREP offers a sustainable agriculture calendar at: [www.sarep.ucdavis.edu/](http://www.sarep.ucdavis.edu/) (click on "Course, Workshops, Events"). Please feel free to add sustainable agriculture events.

### **\* NATIONAL/INTERNATIONAL CALENDAR**

The National Agricultural Library maintains a calendar at [www.agnic.org](http://www.agnic.org) It links to more than 1,200 major national and international agricultural conferences.

### **\* 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: Reggie Knox, CAFF, (831) 457-1007, [reggie@cruzio.com](mailto:reggie@cruzio.com).

## **AUGUST**

**19** *Organic Foods 2000: Challenges and Opportunities*, Sheraton Seattle Hotel & Towers, Seattle, Wash. Co-sponsored by the American Association of Cereal Chemists & the American Phytopathological Society. To register: (651) 454-7250; Fax: (651) 454-0766; [aacc@scisoc.org](mailto:aacc@scisoc.org); or write to: AACC, 3340 Pilot Knob Road, St. Paul, MN 55121

## **SEPTEMBER**

**16** *Fairfield-Suisun Food Security Harvest Faire*, St. Mark's Church, Fairfield, Solano County. Faire funded by SAREP. Contact: Diane Metz, UC Cooperative Extension, Solano County, (707) 421-6790.

## **OCTOBER**

**10-11** Community Food Security Symposium, Sponsors: UC Food Security Workgroup, SAREP. Site: UC Berkeley. Keynote speakers: Jan Poppendieck, Hunter College; Kathy Lawrence, Just Food. Panels, round table discussions, concurrent sessions, tours. Contact: Lucia Kaiser, UC Davis, (530) 754-9063; [llkaiser@ucdavis.edu](mailto:llkaiser@ucdavis.edu)

**19-20** *Understanding the Challenges & Opportunities for Eco-labels & Eco-brands*, Food Alliance conference, Portland Hilton, Portland, Ore. Contact: Theresa Steig, (206) 524-5302; [www.thefoodalliance.org](http://www.thefoodalliance.org)

**20-22** *Bioneers Conference: Revolution from the Heart of Nature—Visionary & Practical Solutions for Restoring the Earth*. Marin Center, San Rafael, Calif. Speakers: Wes Jackson; Joel Salatin; Paula Gunn Allen; Alice Walker.

Contact: Bioneers/CHI, 901 W. San Mateo Rd., Ste. L, Santa Fe, NM; Tel (toll free): (877) 246-6337 or (505) 986-0366; Fax: (505) 986-1644; [chisf@bioneers.org](mailto:chisf@bioneers.org); [www.bioneers.org](http://www.bioneers.org).

**29-31** *Community Food Security Coalition 4th Annual Conference*, Santa Fe, New Mexico. Presentations on food, farming, hunger, policy, youth & communities, rural-urban issues, regional issues. Contact: Community Food Security Coalition, PO Box 209, Venice, CA 90294; Tel: (310) 822-5410; Fax: (310) 822-1440; [asfisher@aol.com](mailto:asfisher@aol.com)

**31-Nov 2** *Marketing Outreach Conference for Limited Resource Farmers and Ranchers*, Coop. State Research, Educ. & Exten. Service/USDA's Ag. Marketing Service, Double Tree Inn, Modesto, CA. Marketing skills, tools, & opportunities required for success. Karen Jameson, Ag. Marketing Service, (202) 720-5731, [Karen.Jameson@usda.gov](mailto:Karen.Jameson@usda.gov)

## NOVEMBER

**17-19** *16th Annual California Farm Conference: Healthy Farms, Healthy Communities*, Santa Rosa Junior College. Sponsors: Community Alliance with Family Farmers, Occidental Arts & Ecology Center, UC Small Farm Center, UC Cooperative Extension, Santa Rosa Junior College, Golden Gate Marketing Assoc., USDA Farm Services Agency, Southland Farmers Market Assoc. 2-day registration: \$90; half-day short course: \$25. Call (530) 888-9206; [www.californiainfarmconference.com](http://www.californiainfarmconference.com); or email: [fullcircle@jps.net](mailto:fullcircle@jps.net)

**27-30** *Managing Watersheds in the New Century*, 8th Biennial Watershed Management Council Conference, Asilomar Conference Center, Monterey/Carmel. Watershed Management Council, c/o PSRP, Univer. of Calif., One Shields Ave., Davis, CA 95616-8688; (510) 273-9066; Fax: (510) 530-4640; [wmc@watershed.org](mailto:wmc@watershed.org)

## JANUARY 2001

**24-27** *21st Annual Ecological Farming Conference*, Asilomar, CA. Contact: Committee for Sustainable Agriculture, 406 Main St., Ste. 313, Watsonville, CA 95076; (831) 763-2111; [www.csa.org](http://www.csa.org)

## Sources of Funding

### SAREP Grants

Look for SAREP Requests for Proposals (RFPs) to be released in January 2001. SAREP expects to offer grants for research and education projects with typical awards of \$5,000-\$20,000. These grant awards will be allocated in July 2001. RFPs will be sent to all California residents on the SAREP mailing list and will be posted on the Web site ([www.sarep.ucdavis.edu](http://www.sarep.ucdavis.edu)) as soon as they are released. For more information, please contact SAREP grants manager **Bev Ransom** at (530) 754-8546 or [baransom@ucdavis.edu](mailto:baransom@ucdavis.edu)

### Organic Research Grants

The Organic Farming Research Foundation (OFRF) invites applications for research grants of up to \$10,000 for consideration in its twice-yearly funding cycle. Funds are offered for organic farming research, dissemination of research results to organic farmers and growers interested in making the transition to organic production, and consumer education on organic farming issues. OFRF technical program coordinator **Jane Sooby** is available to work with farmers and others interested in doing on-farm research and applying for grants. The foundation's on-farm research guide gives an overview of the research process and is accessible through OFRF's Web site ([www.ofrf.org](http://www.ofrf.org)) under "research program" or can be ordered free of charge by calling OFRF at (831) 426-6606. The deadlines for proposal consideration are **January 15** for the spring funding cycle and **July 15** for the fall funding cycle. Contact Sooby at OFRF, PO Box 440, Santa Cruz, CA 95061 or email [research@ofrf.org](mailto:research@ofrf.org) or [jane@ofrf.org](mailto:jane@ofrf.org)

**SUSTAINABLE AGRICULTURE** is a publication of the UC Sustainable Agriculture Research and Education Program (SAREP). SAREP provides leadership and support for scientific research and education to encourage farmers, farmworkers, and consumers in California to produce, distribute, process and consume food and fiber in a manner that is economically viable, sustains natural resources and biodiversity, and enhances the quality of life in the state's diverse communities for present and future generations.

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