

# SUSTAINABLE AGRICULTURE

On the Central Coast, everybody's gone syrphid:

## SAREP receives US-EPA grant for biological control of lettuce pests

by Robert L. Bugg, SAREP

Darting between fields of organic romaine lettuce and rows of flowering sweet alyssum, yellow-and-black-striped hoverflies (syrphids) attack lettuce aphid, one of the crop's most important pests. Aphids and other lettuce pests in California's Salinas Valley should not look for their situation to improve. In late May 2004, the U.S. Environmental Protection Agency Region 9 approved a UC SAREP proposal entitled "Enhancing Biologically Integrated Farming Systems (BIFS) for Lettuce on the Central Coast Of California." The grant will provide \$196,000 for two years with an option for renewal, potentially totaling nearly \$400,000 for a four-year BIFS project.

This project will focus on research and outreach to enhance biological control and other least-toxic tactics for lettuce pest management in the Salinas Valley. The work will be carried out by a team that includes **Bill Chaney**, UC Cooperative Extension Monterey County farm advisor and colleagues from the private sector, as well as UC SAREP staff (**Robert L. Bugg**, **Janet C. "Jenny" Broome**, **Bev Ransom**). A main goal of the work is to enable lettuce growers to reduce reliance on organophosphate and carbamate insecticides.

"I have been conducting work in this arena for over a decade, including stud-



Adult hoverfly

ies on the use of nectar-bearing plants like sweet alyssum to promote hoverflies that attack aphids," said Chaney. "It is exciting to be able to work with a mix of organic and conventional lettuce growers to take the research and outreach to another level."

Chaney noted that the organic growers routinely use insectary plants to combat aphids and other pests, a method that can be adapted to conventional production systems.

"We already have a pretty good handle on the problem by just using annual insectary plantings like sweet alyssum. Our planned studies should show us whether we can gain anything by using insectary hedgerows of perennial woody plants," he said.

Conditions on California's Central Coast are especially promising because organic growers, including Natural Selection Foods, have extensive experience using sweet alyssum to attract hoverflies and suppress aphids in romaine and broccoli.

**Ramey Colfer**, an entomologist with Natural Selection Foods, said his data show that hoverflies are the dominant lettuce aphid predators near the coast, but that further inland, lady beetles and bigeyed bugs may become increasingly important.

"We organic romaine growers meet the same cosmetic standards as conventional

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## Organic strawberries, almonds continue to grow

[Note: Portions of this column appeared in the June 2004 issue of *Western Fruit Grower* magazine.]

Organic strawberry growers in California declared total sales of \$17.3 million on over 1200 acres statewide in 2003, ranking fourth among all of the state's organic fresh commodities, according to the California Department of Food and Agriculture's (CDFA) Organic Program. This was the most highly productive year on record for this growing industry segment, which now represents approximately 3% of industry value. More than 160 organic strawberry growers are registered with the California Organic Program.

UC SAREP, as a technical representative to the California Organic Program's Advisory Board and with the support of the department's "Buy California" campaign, sponsored two short courses for California organic strawberry producers in February 2003 (Salinas) and January 2004 (Ventura). Over 150 growers, nursery operators, advisors, and other agricultural professionals attended the short courses, where UC, USDA, and industry researchers and specialists reviewed the science-based information available to guide organic strawberry production practices. Growers interested in organic strawberry production will be encouraged to hear that a growing body of research exists and that researchers are making progress in documenting and searching for solutions to production problems. Some highlights from the short courses include:

- Rotational sequences with cover crops and vegetable crops, especially broccoli and related plants, build organic matter, reduce weeds, and reduce soil borne disease and are essential to organic strawberry production.
- Although compost remains the most important source of organic matter for production, inoculated compost and root inoculants did not increase organic strawberry yield, although some

promising research on bacterial inoculants has been reported and research continues on this topic.

- An organic strawberry crop typically uses approximately 100 lbs. of nitrogen/acre, but supplemental nitrogen fertilization from organic sources is commonly used due to the unpredictability of soil nitrogen mineralization from other organic sources. There is a critical need to make more efficient use of nitrogen sources for organic production.
- Three UC cultivars, Aromas, Pacific, and Seascape, were the highest yielding cultivars in tests in organic systems. Additional non-UC cultivars also have performed well in organic production.
- Weed control remains the major pest control expense for organic strawberry growers. Corn gluten meal and ozone treatments did not provide adequate weed or disease control. Black, brown, and dark green plastic mulches give the highest weed control and marketable fruit in production tests. Research continues on methods of pre-plant reduction of weeds for organic
- Alfalfa trap crops on field edges accumulated 5-10 times the number of lygus bugs (a key cosmetic pest on the Central Coast) when compared with control strawberry rows. Trap crop management with tractor-mounted vacuums reduces lygus bug populations in the trap crop by 75-85% on a weekly basis. Research continues on the assessment of trap crop management and reduction of damage in organic strawberries.
- New York research has found that gray mold is less of a problem in organic



production systems than in conventional. The mold can be reduced by using clean planting material, growing berries away from coastal fog, removing diseased leaves and fruit, and using lower density plantings.

- Price premiums available for fruit, especially early in the season, are an important factor in calculating profitability. A cost-of-production study calculated that at median organic production levels, profitable organic production can begin at an average price of \$8.00-\$8.50 per 12-pound tray. Organic production is not profitable at prices below this level.
- Economic performance depends on numerous factors, including variety, climate, and price and demand; however, all participants agreed that organic strawberry production requires increased management skill and organizational ability, especially in the early stages of conversion to these practices.

Many practical research questions remain concerning controlling and reducing costs of production, more efficient use of resources, and future markets. With funding from CDFA, UC SAREP is now editing the short course notebook materials and assembling the *Organic Strawberry Production Manual*, expected to be published by UC in 2005.

## Almonds

Organic almond growers in California declared total sales of approximately \$7 million on nearly 3,600 acres statewide in 2003, ranking ninth among all organic fresh commodities, according to CDFA's Organic Program. Organic almonds, a segment that now represents approximately 1% of this growing commodity segment, also had a highly productive year, with more than 100 organic almond growers registered with the state's organic program.

In response to the growing organic almond market, UC SAREP, UC Cooperative Extension Madera County, California Certified Organic Farmers (CCOF) and New Era Farm Service sponsored the first day-long workshop for the state's organic almond producers at the Madera County Conference Center in June. Over 80 growers, advisors, and other agricultural professionals attended the workshop, where UC researchers and industry representatives presented current science-based and regulatory information available for organic almond production. Speakers at the workshop included SAREP director **Sean L. Swezey** (*Overview of Organics in California*); **Jake Lewin**, CCOF marketing director, and **Jessica Hamburger**, CCOF program director (*Organic Market Expansion and Opportunity*); **Karen Klonsky**, UC Davis agricultural and resource economics Cooperative Extension specialist (*Costs and Returns from Organic Almond Production*); **Ray Green**, CDFA Organic Program manager (*Regulation, Certification and Allowable Materials*); **Roland Meyer**, UC Davis Cooperative Extension soil specialist (*Fertility Management in Organic Almonds*); and **Kent Daane**, UC Berkeley/Kearney Ag Center Cooperative Extension entomologist (*Insect Management in Organic Almonds*). Madera County farm advisor and program organizer **Brent Holtz** gave an overview of production methods, orchard establishment issues, weed control, and disease management practices. An afternoon field trip to CCOF-certified Sherman Thomas Ranch where **Mike Braga** discussed organic production practices with the participants,

rounded out the highly informative productive workshop.

Excellent questions and discussion characterized the workshop from start to finish; it is clear a large body of research-based information exists that can greatly assist organic almond producers. It is antici-

pated that the workshop materials will be assembled and published in a UC SAREP-sponsored organic almond production manual in the near future.—*Sean L. Swezey, director, University of California Sustainable Agriculture Research and Education Program*

## SAREP associate director takes leave in Scotland

I am excited to report that I will be taking a professional development leave to analyze data and write articles based on work I have conducted with colleagues over the past five years at SAREP. The focus will be my work with SAREP's Biologically Integrated Farming Systems (BIFS) and Alternatives to Methyl Bromide programs, as well as my research in plant pathology. The BIFS program has brought in over \$3 million in federal and state funds to UC and supported 10 multiple-year agricultural chemical use/risk reduction projects in nine commodities throughout California. The methyl bromide alternatives grants program has funded six multiple year research projects in strawberries, grapes, and stone fruit, as well as one demonstration project. These projects recently ended, and with the impending loss of methyl bromide in 2005, it is important to synthesize results from that work and other relevant research projects to provide grower-friendly outreach materials as the agricultural community loses this key soil fumigant.

Additionally, based on my work with the UC Davis College of Agricultural and Environmental Sciences committees on sustainable agriculture, I will be studying European universities' efforts to address sustainable agriculture goals, including

an agricultural, historical and cultural preservation initiative taking place on the Ca'Tron Estate, a 2,000-year-old farm in northern Italy.

I will be a visiting fellow at the Scottish Agricultural College in Edinburgh, Scotland. This will enable me to attend seminars and cooperate with several Scottish plant pathologists working on soil-borne pathogens, and biological and cultural controls of strawberry and cane berry pathogens.

I was able to obtain funding to support me during this leave, and thanks to the encouragement and support of SAREP director **Sean L. Swezey** and UC ANR leadership, I look forward to continuing to work with many of you, albeit, from a slightly longer distance.

On a personal note, my husband, **John R. Hall**, UCD professor of sociology, has been named director of the UC Education Abroad Edinburgh Study Centre for Northern England and Scotland for two years. This leave will allow me to pursue my SAREP research and administrative duties while living with my family, based in a location that will permit ready access to agricultural research and education institutions throughout Europe. —*Jenny Broome, SAREP associate director.*

# Humphrey Fellows collaborate with SAREP

By Rita Agboh-Noameshie, Humphrey Program/SAREP

UC SAREP hosted three UC Davis Humphrey Fellows beginning in April 2004. Founded in 1978 in honor of the late senator and vice president, the **Hubert H. Humphrey Fellowship Program** encourages a variety of U.S. and foreign partnerships worldwide. During their Fellowship year, Humphrey Fellows participate in professional development activities and graduate-level academic coursework. The program is not a degree program, but rather is designed to provide broad professional enrichment through a combination of activities tailored to each Fellow's interests. All Fellows participate in workshops and conferences that provide interaction with leaders from U.S. federal, state, and local governments, multinational organizations and the private sector.

Fellowships are awarded competitively to candidates with a commitment to public service in both the public and private sectors. The main fields of interest are natural resources and environmental management, public policy analysis and administration, law and human rights, finance and banking, economic development, agricultural development/economics, human resource management, urban and regional planning, public health policy and management, technology policy and management, educational planning, teaching of English as a foreign language and drug abuse, epidemiology, and education.

Three Fellows from the 2004 class, **Afiavi Rita Agboh-Noameshie** of Togo, West Africa, **Suzan M. Al-Ajjawi** of Bahrain, and **Yao Nguessan** of Côte d'Ivoire, West Africa, worked on a project for SAREP's organic farming research and education initiative. They conducted an impact assessment project of three UC Cooperative Extension (UCCE) organic farming programs in Ventura, Humboldt and Marin counties that were supported by a SAREP grant from the Clarence E. Heller Charitable Foundation. The integrated research and



L-R: Humphrey Fellow Suzan Al-Ajjawi, SAREP associate director Jenny Broome, Humboldt County director Deborah Giraud, Humboldt organic farmer Paul Giuntoli, Humphrey Fellow Yao Nguessan and Humphrey Fellow Rita Agboh-Noameshie

educational activities were aimed at helping growers improve their organic farming and marketing practices. **Jenny Broome**, SAREP associate director, supervised their work, and **Paul Marcotte**, director of the UC Davis Humphrey Fellows Program, provided direction as a social scientist.

A mix of methodologies was used to collect quantitative and qualitative data including a literature review followed by interviews, focus sessions and surveys of county growers and other interested clientele in each county, as well as interviews with the county directors and program coordinators.

Focus sessions were conducted to assess user needs and experience after two years of program implementation. In each county, growers were invited to a focus session in which they discussed benefits they have de-

rived from the program, as well as current needs they wanted UCCE to address.

In each county, the evaluation team visited farms and research sites and talked with growers and UCCE staff about their experience with the organic program, including benefits gained and particular challenges that might need more attention.

A survey questionnaire was prepared for each county, taking into consideration the characteristics of the production zone. A questionnaire placing emphasis on row and tree cropping systems was developed for Ventura County, while dairy products and animal care in addition to row and tree crops were considered for Marin and Humboldt counties.

Geographic information system (GIS) was used to map suitable farmlands using a



digital elevation model to identify the location of organic farms. The parcel database including all organic farmers from the three counties is a valuable asset and will be further developed to include more parameters such as annual yield for each commodity.

Based on the focus sessions and interviews, the organic farming impact assessment effort has found that most of the participating growers were enthusiastic and feel very positively about the organic farming program. In the three counties, most wanted the program to continue and see it become permanent. The county directors and coordinators are very confident about their programs, their roles, and acknowledge the valuable collaboration and support from SAREP and the Clarence E. Heller Charitable Foundation. They suggested that greater collaboration in research and extension work among the counties with similar organic programs would be valuable and worth encouraging.

Completed survey questionnaires are still arriving at the SAREP offices; over the next few months, data will be analyzed and a final report produced.

The 2004 Humphrey Program ended on June 11. Two of the Fellows, Agboh-Noameshie and Nguessan, have been able to extend their stay in California. Agboh-Noameshie will remain at SAREP and work



Suzan M. Al-Ajjawi

Rita Agboh-Noameshie

Yao Nguessan

on the survey analysis through the summer and write a final report. Nguessan will be working with SAREP and the California Department of Food and Agriculture (CDFA) developing a Web site with map-based information on organic farming operations in California.

Agboh-Noameshie is the National Coordinator of Farming Systems Research and Technology Transfer in Togo, West Africa. She has a doctorate in agronomy/crop production from the University of Ibadan, Nigeria. Agboh-Noameshie is responsible for ensuring that farmers are able to adopt technologies from research institutes by working with extension programs and development organizations.

Al-Ajjawi has a Bachelor of Science degree in civil engineering from the College of Engineering of the University of Bahrain. She serves as head of the technical coordination section at the Environment and Wildlife Directorate of Bahrain.

Nguessan is Chef de Service de la Banque des Données Minières Sodemi (Société pour le développement minier de la Côte d'Ivoire) in Abidjan, Côte d'Ivoire. He has been database/LAN manager and responsible for the Geo Information Management Systems Project. He has a Master of Science degree in geoscience from Ohio University, where he majored in geophysics and seismic data processing.

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## GRANTS CONTINUED FROM PAGE 1

growers," he said. "In most cases, the natural enemies, especially the hoverfly larvae, clean up the aphid infestations for us, but sometimes we have to resort to organically approved insecticides. This project should help us better understand how to manage the beneficial insects, so that even organic growers can reduce insecticide use."

The project will involve Colfer and other cooperators, including **Phil Foster** and **Patrick Troy**, as mentor farmers who

will assist enrolled growers in understanding, adapting, and implementing the techniques. Another cooperator is **Sam Earnshaw** of the Community Alliance with Family Farmers (CAFF), who has established many insectary hedgerows on Central Coast farms. Earnshaw, whose background includes organic vegetable production and forestry, will plan and establish a state-of-the-art demonstration hedgerow on an organic farm near Salinas that will serve as a

model system for other farmers in the area.

The project will get underway in October 2004, when a postdoctoral researcher will be hired to coordinate the research and outreach. In November, interested growers will be enrolled as participants, and the research, monitoring, and mentoring will begin. For further information, please contact Chaney at (831) 759-7350, wechaney@ucdavis.edu, or Bugg at (530) 754-8549, rlbugg@ucdavis.edu.

# Conservation tillage, sustainable ag field day showcases research

by Lyra Halprin, SAREP

Beautiful weather and fresh produce from local farmers provided the backdrop for a successful conservation tillage/sustainable agriculture field day at UC Davis' Russell Ranch in June. The field day highlighted research results and the evolution of UCD's 16-year Sustainable Agriculture Farming Systems (SAFS) project into a conservation tillage experiment.

California Undersecretary of Agriculture **Charles "Chuck" Ahlem**, a Hilmar dairyman, noted in his keynote address that model projects like the conservation tillage experiment are important to the future of the state's agricultural industry.

"We need to bring a broader vision to the California Department of Food and Agriculture by working with other agencies on issues ranging from nutrition to the environment and to trade," Ahlem said. He also noted that the department's new mission is focused on the "delivery of safe food



SAFS project leader Will Horwath demonstrates water monitoring. (photo by Margaret Macsems)

and fiber through responsible environmental stewardship in a fair marketplace."

SAFS project leader **William Horwath**, a UC Davis professor and soil biogeochemist in the land, air and water resources (LAWR) department, noted that the work of the UC researchers and cooperators contributes to those goals.

"Farmers don't have the time or resources to do this research on their own, and helping to provide results and leadership is the role of the University of California agricultural experiment stations," Horwath said.

Some of the most important results from the original SAFS project identified where growers can reduce synthetic fertilizer inputs; how to manage cover crops, crop residue and soil organic matter; and how to manage weeds and pests with fewer pesticides, Horwath said. The project, which began in 1988 with funding from UC's Sustainable Agriculture Research and Education Program (SAREP), developed a much clearer understanding of the economic opportunities and limitations to organic farming practices.

The project has relocated to Russell Ranch, which is also home to the College of Agricultural and Environmental Sciences' Long-Term Research in Agricultural Systems (LTRAS) experiment.

"We're emphasizing conservation or reduced tillage, and the use of non-cash cover crops to improve soil and water quality in typical California cropping systems," Horwath said.

"The new project has taken on an additional focus," Horwath said. "We're studying the effects of conservation tillage and cover cropping on the way sediment, nutrients, and pesticides are transported off conventional, cover-cropped and organic farming systems."

"We're also looking at the tradeoff between ecological benefits and economic costs in a sustainable system," he said.

In addition to the main plots at the Russell Ranch, the project includes a 14-acre area for companion studies designed to refine management practices for successful use of conservation tillage and cover cropping in Yolo County conditions.



Soil microbiologist Kate Scow shares soil food web information. (photo by Margaret Macsems)



UCCE farm advisor Kent Brittan compares corn yields. (photo by Lyra Halprin)

**Steve Kaffka**, UC Cooperative Extension specialist in the agronomy and range science department and LTRAS director, helped welcome visitors to the field day and site.

#### Field site presentations

At four separate stations in the field, SAFS researchers presented research information to visitors.

**Wes Wallender** (UCD LAWR professor, hydrology), **William Horwath** (UCD LAWR professor, soil biogeochemistry), **Aaron Ristow** (LAWR graduate student researcher), and **Sam Prentice** (LAWR post-graduate researcher) discussed water conservation in cover-based cropping systems, runoff monitoring challenges, and the implications for growers needing to comply with upcoming discharge permits.

**Dennis Bryant** (LTRAS associate director) reviewed the overall facility design, nutrient inputs and differences in the winter legume cover crop, conventional and organic tomato and corn systems under standard and conservation tillage management. **Gene Miyao** (UC Cooperative Extension farm advisor, Yolo/Solano/Sacramento counties) discussed in-season vs. post-crop tillage, weed control issues and production options in the processing tomato systems. **Kent Brittan** (UC Cooperative Extension farm advisor, Yolo/Solano/Sacramento counties) covered challenges in stand establishment

and yield potential of conservation tillage corn production.

Weeds in furrow, drip and sprinkler irrigation system comparisons was the topic of the presentation by **Jeff Mitchell** (UCD Vegetable Crops Cooperative Extension specialist/Kearney Agricultural Center, cropping systems, soil quality, organic soil amendments) and **Kipp Sutton** (International Agricultural Development graduate student researcher, soil science). **Kaden Koffler** (Agronomy and Range Science graduate student researcher) talked about maximizing cover crop compatibility with conservation tillage, while **Steve Temple** (UCD Agronomy and Range Science Cooperative Extension specialist) discussed amplifying crop options for conservation tillage systems with a focus on grain legumes.

**Howard Ferris** (UCD Nematology professor), **Kate Scow** (LAWR/Kearney Foundation/Agricultural Experiment Station soil microbial ecologist), and **Louise Jackson** (UCD Vegetable Crops Cooperative Extension specialist), discussed plant nutrition, the soil food web and pest management.

After the field discussions, **Karen Klonsky** (UCD Agricultural and Resource Economics Cooperative Extension specialist, farm management), gave a presentation on the economic impact of conservation tillage management systems.

A grower panel discussion, "Farmer perspective on conservation tillage research results: Field application of agronomic and pest considerations," was facilitated by Brittan. Grower participants included **Blair Voelz**, **Paul Underhill**, **Jeff Main**, and **Charlie Rominger**.

Participants' feedback indicated that most gained a clearer understanding of conservation tillage, the importance of the soil/food web, and the challenges facing minimum/no-till farming. Most respondents were very pleased with the presenters, particularly with the input from local producers on the grower panel.

For more information about SAFS' conservation tillage project, see the Web site at <http://safs.ucdavis.edu>.

UC SAREP is collaborating with the SAFS project on outreach, including the SAFS newsletter, Web site, and field days.



UCCE Marin organic program coordinator Steve Quirt, right, and other field day participants enjoyed lunch at the SAFS/LTRAS facility "barn." (photo by Margaret Macsems)



# Alternatives to preemergence herbicides

by Kendra Baumgartner, USDA-ARS, Department of Plant Pathology, Lissa Veilleux, UC SAREP, Department of Plant Pathology, and Janet C. "Jenny" Broome, UC SAREP

*In August 2002, USDA ARS plant pathologist Kendra Baumgartner and UC SAREP Associate Director Janet C. "Jenny" Broome signed a two-year cooperative agreement to target funds toward research into the development of sustainable weed management for winegrapes. We are pleased to provide here a summary of some of the results of this cooperation.*

For the past several decades, advances in weed management were largely due to advances in herbicide technology, which has undoubtedly led to improvements in crop productivity and farm labor efficiency. Several factors, however, including emergence of resistant weed populations, have caused growers and researchers to question this growing dependence on herbicides (Liebman and Gallandt 1997). The California winegrape industry has taken a particular interest in finding alternatives to preemergence herbicides. One reason is the threat preemergence herbicides pose to water quality. Preemergence herbicides have been found to contaminate both surface and ground waters due to their persistence in the soil (Pimentel et al. 1992). Growing concerns over water quality and impending legislation may make some preemergence herbicides unavailable. Alternatives may soon be a necessity. Another reason the industry is interested in alternative methods is a trend toward more sustainable viticultural practices. In an effort to be more sustainable, some growers reduce their preemergence herbicide. Fear of ineffective weed control, however, is still the largest reason the majority of growers continue to use more conventional methods (Barberi 2002, Bond and Grundy 2001). Research into alternative methods can provide the evidence some growers require before they adopt more sustainable practices.

Warwick (1991) documented herbicide resistance in more than 100 species, highlighting the importance of exploring non-chemical weed control options. Shifts in weed populations, however, are not only associated with herbicides but with cultural practices as well (Liebman and Gallandt 1997). For this reason, it is important to



Researcher Lissa Veilleux collects vineyard harvest data. (photo by Kendra Baumgartner)

combine weed management strategies in order to avoid shifts toward weed species that become difficult to manage when there is reliance on a single weed control practice.

Our research examines several alternative weed control practices used alone and in combination. We address two very different, yet equally important, aspects of using these practices. First, we address their effects on weed establishment. Second, we address their effects on vine yield, growth, and nutrition. An understanding of both aspects is important to growers who desire effective weed control practices that do not adversely affect yields.

In 2002 and 2003, we examined three weed control practices: glyphosate (Roundup®, Monsanto), in-row soil cultivation with a Radius Weeder® (Clemens and Co., Wittlich, Germany), and Matran™ (EcoSmart Technologies, Inc.) (Baumgartner and Veilleux 2004). All

three were tested alone and in combination to give a total of seven experimental treatments, including a non-treated control ("natural vegetation") (Table 1). An eighth treatment, an in-row cover crop, was established, but data was not included in the analysis due to poor cover crop establishment.

Preliminary results from this research are encouraging. We detected significant differences among treatments after only one year of applications (Figure 1). The most effective weed control treatment, based on total weed biomass, was Winter Roundup®/Spring Roundup®. Least effective were Winter Matran™/Spring Matran™, Spring cultivation, and the natural vegetation control. Intermediate were the three treatments with a fall cultivation. Matran™ was very effective against broadleaves, but was least effective against grasses. Although Matran™ did not control grasses, the dominant grass weed was the



**Table 1: Weed control practices associated with experimental weed control treatments.**

Experimental Treatment	Practice	Date Applied <sup>c</sup>	Rate Applied
<b>1. Winter Roundup<sup>®</sup>/Spring Roundup<sup>®</sup></b>	Roundup <sup>®a</sup>	22-02-03	2 qt/acre
	Roundup <sup>®</sup>	22-05-03	4 qt/acre
<b>2. Fall Cultivation/Spring Cultivation</b>	Clemens	27-11-02	in-row cultivation
	Clemens	16-05-03	in-row cultivation
<b>3. Fall Cultivation/Spring Matran<sup>™</sup></b>	Clemens	27-11-02	in-row cultivation
	Matran2 <sup>™ b</sup>	22-05-03	4 gal/acre
<b>4. Fall Cultivation/Spring Roundup<sup>®</sup></b>	Clemens	27-11-02	in-row cultivation
	Roundup <sup>®</sup>	22-05-03	4 qt/acre
<b>5. Winter Matran<sup>™</sup> /Spring Matran<sup>™</sup></b>	Matran2 <sup>™</sup>	22-02-03	4 gal/acre
	Matran2 <sup>™</sup>	22-05-03	6 gal/acre
<b>6. Cover Crop (<i>Festuca idahoensis</i>)</b>	Clemens and Plant	27-11-03	in-row cultivation, seeding
	Mow	15-05-03	mow
<b>7. Natural Vegetation</b>	Mow	18-04-03	mow
	Mow	15-05-03	mow
<b>8. Spring Cultivation Only</b>	Mow	15-05-03	mow
	Clemens	16-05-03	in-row cultivation

<sup>a</sup>Active ingredient: Glyphosate

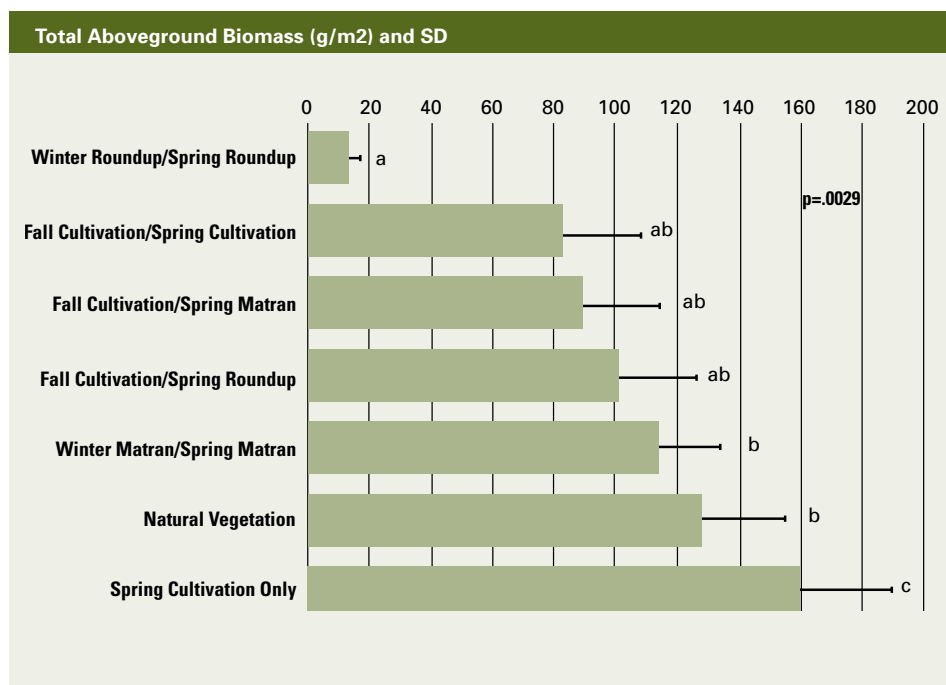
<sup>b</sup>Active ingredient: Clove Oil

<sup>c</sup>Dates presented are from applications made in the first year of the study, Fall 2002 to Summer 2003.

cover crop (*Zorro fescue*, *Vulpia myuros* var. *birsuta*), a low stature grass. Given that Matran<sup>™</sup> controlled the more problematic broadleaves, this treatment was still successful.

Although there were differences in weed control efficacy among treatments, there were no effects on grapevine yield or growth in the first year of this study. In analyzing grapevine nutrition, we found significantly lower potassium levels, although not low enough to be considered deficient, in the three treatments with a fall cultivation.

We will continue this research in the 2004/2005 growing season. Weed studies are best conducted over several years in order to truly understand how weed populations are adapting to specific practices. Some practices that seem effective in the short-term may lead to shifts in weed populations that are difficult to manage in the long-term. For example, in the first



**Figure 1.** Effect of weed management on total aboveground biomass of weeds. Columns with the same letter are not significantly different at  $P \leq 0.05$ , Tukey's test.

year of our study, we found that the Winter Roundup®/Spring Roundup® treatment had the lowest weed biomass, but it also had a significantly lower weed diversity index, as did the other treatment with Roundup® ( $P = 0.001$ ; data not shown). In fact, there were only two weeds present in these treatments, Zorro fescue (*Vulpia myuros* var. *hirsuta*) and panicle willowweed (*Epilobium brachycarpum*). Continued monitoring is important in order to determine if these two weeds

become increasingly difficult to control with Roundup® at this site.

More than one year of research is also necessary to assess the full impact of the practices on vine yield, growth, and nutrition. As previously mentioned, there were significant effects of weed management on petiole potassium concentrations; all treatments with a fall cultivation showed lower levels of petiole potassium. We know that grapevine fine roots are more abundant closest to

the vine trunk (Cheng and Baumgartner, unpublished data). It is likely that in-row cultivation severs these fine roots, cutting off an important source of nutrient uptake. Continual monitoring is important in order to determine if other nutrients will eventually be affected by in-row cultivation.

For more information contact **Kendra Baumgartner**, USDA-ARS, Department of Plant Pathology, (530) 754-7461, kbaumgartner@ucdavis.edu;

## Literature Cited

- Barberi, P. 2002. Weed management in organic agriculture: are we addressing the right issues? *Weed Research* 42: 177-193.
- Baumgartner, K; Veilleux, L. Alternatives to pre-emergence herbicides in North Coast Vineyards. *Proceedings of the 56th Annual Conference of the California Weed Science Society*. Sacramento, CA. January 13, 2004. (accepted for publication, 1/20/04).
- Bond, W; Grundy, AC. 2001. Non-chemical weed management in organic farming systems. *Weed Research* 41: 383-45.
- Cheng, X; Baumgartner, K. 2003. Root system distribution and arbuscular mycorrhizal colonization of grapevines in a California vineyard. *9th International Soil Science Society Conference Abstracts*: 30.
- Gross, KL. 1990. A comparison of methods for estimating seed numbers in the soil. *Journal of Ecology* 78: 1079-93.
- Liebman, M; Gallandt, ER. 1997. Ecological management of crop-weed interactions. In *Ecology in Agriculture*. LE Jackson, ed. San Diego, CA, USA. p 291-343.
- Pimentel, D; Aacquay, H; Biltonen, M; Rice, P; Silva, M; Nelson, J; Lipner, V; Giordano, S; Horowitz, A; D'Amore, M. 1992. Environmental and economic costs of pesticide use. *Bioscience* 42: 750-761.
- Warwick, SI. 1991. Herbicide resistance in weedy plants: Physiology and population biology. *Annual Review of Ecological Systems* 22:95-114.

# SOURCES OF FUNDING

## ORGANIC RESEARCH GRANTS

The Organic Farming Research Foundation is offering research grants of up to \$15,000 for organic farming research and related topics. Deadlines for proposal consideration are **December 15** (a change from the previous January deadline) for the spring funding cycle and **July 15** for the fall funding cycle. For more information see OFRF's Web site ([www.offr.org](http://www.offr.org)), call 831-426-6606 or email [research@offr.org](mailto:research@offr.org).

## EPA GRANTS

The U.S. Environmental Protection Agency (EPA) Region 9 (California, Nevada, Arizona, Hawaii, Pacific Trust Islands) is offering funding for projects under its Pesticide Environmental Stewardship Program (PESP) to support to support research, public education, training, monitoring, demonstrations and studies that reduce the risks and use of pesticides in agricultural and non-agricultural settings in the U.S. Applications must be received by **August 30**. Send applications to Paul A. Feder (CMD-1), US-EPA Region 9, 75 Hawthorne St., San Francisco, CA 94105-3901. To view the grant application on the Web, see (<http://www.epa.gov/oppbpd1/PESP/grants.htm>).

## WESTERN SARE ANNOUNCES PROJECTS, OFFERS FUNDS

The Western Region USDA Sustainable Agriculture Research and Education program recently announced its selection of grants for 2004. Eight projects were funded in California for a total of \$332,058.

### Funded projects

Research and education grants have been awarded to:

- **Steve Schwartz**, California FarmLink, \$93,184. Project to help farmers secure long-term land tenure in order to promote greater sustainability.
- **Molly Johnson**, PlacerGROWN, \$98,395. Program to encourage local shoppers to buy locally produced foods as a way to stem the spread of development onto agricultural lands.
- **Annie Eicher**, UC Cooperative Extension Humboldt County, \$39,377. Training program for organic dairy management.

- **Cynthia Daley**, California State University, Chico, \$60,000. Education program for producers and university extension personnel on the potential health benefits of grass-fed products.

Producer Grants were also awarded to the following groups and individuals: **Alan Haight**, Riverhill Farm, Nevada City; **Deborah Walton**, Petaluma; **Mary Ann Vasconcellos**, San Luis Obispo; and **Kevin Lee**, Small Farm Resource Training Center, Fresno.

### New funding available

Western SARE is now accepting proposals for the next round of funding. **October 1** is the deadline for farmer/rancher and ag professional-producer grants; **October 15** is the deadline for the Professional Development Program grants. The Calls for Proposals are available on the Web at <http://wsare.usu.edu> or by calling the Western SARE office at Utah State University, (435) 797-2257.

## STAFF ACTIVITIES

SAREP associate director **Jenny Broome** served on the UC Davis College of Agricultural and Environmental Sciences Agricultural Sustainability Institute implementation committee. The report is under internal review and will be finalized and submitted to Dean **Neal Van Alfen** by mid-summer.

Broome co-hosted UCD visitors from the Veneto region of Italy, **Antonio Zamboni** and **David D'Andrea**, who participated in the spring sustainable agriculture speaker series organized by **Mark Van Horn**, UC Davis Student Experimental Farm director, and graduate students in International Agricultural Development. She also supervised three UC Davis Humphrey Fellows as they completed a project at SAREP (see "Humphrey Fellows collaborate with SAREP," page 4).

Broome presented information on integrated gray mold management for Sacramento Valley strawberries at a field day organized by UC Cooperative Extension (UCCE) farm advisor **Chuck Ingels**. The field day was for small farmers, many of whom are Asian immigrants who relocated to the region. Ingels is a former SAREP perennial cropping systems analyst.

Broome, SAREP director **Sean L. Swezey**, SAREP education coordinator **David Chaney** and visiting scholar **Chulgoo Kang** presented a poster at the fourth California Conference on Biological Control: Biological Control and Organic Production at UC Berkeley in July. They provided preliminary results from an email survey on UC organic farming research and extension that Kang conducted in the spring of 2004. A SAREP report will be produced this fall. **Scott Kingston**, a UCD student working with SAREP, helped layout and design their poster, and a poster presented by **Aimee Shreck**, SAREP post-doctoral student, SAREP food systems analyst **Gail Feenstra**, and Christy Getz, UC Berkeley. Their poster, "Social Sustainability, Farm Labor, and Organic Agriculture: Findings from an exploratory analysis," presented initial findings on the implications of organic agriculture for California farmworkers, and was funded by the Institute for Labor and Employment. Researcher **Sam Prentice** and Swezey presented a poster "National Organic Program Technical Advisory Review Process: Case Studies."

Swezey gave the introductory remarks during the third day of the conference, which focused on organic farming. He also presented information detailing his research with trap crops for pest control in organic strawberries. He will speak on "IPM in Organic Systems: California Organic Cotton Production" at the International Congress of Entomology in Brisbane, Australia in late August.

Broome presented a poster on her EPA-funded research into validation of a weather-driven disease risk model for management of gray mold in strawberries at the American Phytopathological Society meeting in Anaheim. At that meeting she was part of the panel "Organic Foods—From Production to Market," during a day dedicated to sustainable agriculture (see <http://www.apsnet.org/meetings/2004/susagriday.htm>). She discussed "Organic farming and plant disease research by the University of California 1987-2004." She will also be part of a panel at the Rural Sociological Society's 67th annual meeting in Sacramento. The panel will cover the "Politics of Sustainability: Genesis and Evolution of the Sustainable Agriculture Research and Education Program at the University of California," which will provide an opportunity to engage social scientists in a reflection on the goals, social movement, and science of sustainable agriculture, and how they relate to SAREP and UC. Shreck, Feenstra and Getz will present a paper on "Social Justice and Sustainable Agriculture: The 'Labor Question' and the Organic Agriculture Movement in California" at the meeting.

Feenstra participated in a National Association of Farm Direct Marketing conference in Sacramento where she made a presentation on farm-to-school programs, and two meetings of the national Agriculture of the Middle Task Force where she met with California growers and nonprofits interested in local initiatives to preserve midscale agriculture. She gave a food systems presentation at the UC Garden-based Learning Workgroup in Davis, a food systems/food security presentation at the California Public Health Association in Oakland, and presented the keynote address on food security at the Childhood Hunger/Food Security conference in Alberta, Canada.

Feenstra also made a farm-to-school presentation at the Kellogg Foundation Food

and Society Conference at Lake Tahoe and at the Maternal and Child Health Conference in Chicago. She attended the Agriculture, Food and Human Values Society Conference in Hyde Park, NY and is working with interested parties at UCD and nonprofits to organize the national conference in Davis in 2007; contact her at [gwfeenstra@ucdavis.edu](mailto:gwfeenstra@ucdavis.edu) for more details. She has also been working with the Roots of Change-funded Vivid Picture Project to identify a sustainable food system in California (see <http://vividpicture.net>).

Feenstra and **Jeri Ohmart**, SAREP's organic and food systems program assistant, are conducting evaluations of the Davis and Winters farm-to-school programs and the California Department of Education's Linking Education, Activity, and Food (LEAF) program in Berkeley. Feenstra and Ohmart attended the LEAF team meeting in San Diego, where Ohmart made a presentation representing the 10 LEAF grantees. The program is striving to create healthier school environments by linking food service, physical education and science curriculum.

Ohmart made a presentation at the UC Garden-Based Learning Workgroup at UCD. She and Feenstra have developed an innovative way to study children's food selections—taking hundreds of digital photos of lunches and analyzing portions. Ohmart participated in the second annual California Food and Justice/Community Food Security Summit in Los Angeles.

Ohmart began a part-time appointment as UCD School Gardens Project coordinator, which includes projects linked to SAREP's farm-to-school work. Its mission is to integrate garden activities and food awareness into the school curriculum, helping children identify healthy lifestyles, concern for the environment, and academic achievement through land-based learning. A series of fall 2004 workshops is being offered on these topics; contact Ohmart at [johmart@ucdavis.edu](mailto:johmart@ucdavis.edu).

**Lyra Halprin**, SAREP public information representative, and outreach coordinator for the UC Davis College of Agriculture Sustainable Agriculture Farming Systems (SAFS) project, coordinated the June 2004 SAFS field day at UCD's Russell Ranch (see "Conservation tillage, sustainable ag field day showcases research," page 6.)



# CALENDAR

## ■ SAREP WEB CALENDAR AND ONLINE COURSE

SAREP offers a regularly updated sustainable agriculture calendar on our World Wide Web site at: [www.sarep.ucdavis.edu](http://www.sarep.ucdavis.edu) (click "Calendar" on top menu bar). Please feel free to add sustainable agriculture events. In addition, we offer an online course for pest control advisers and others titled *Ecological Pest Management in Grapes*. Up to 11 CE credits for California PCAs. See [www.sarep.ucdavis.edu/courses/grapes/](http://www.sarep.ucdavis.edu/courses/grapes/)

## ■ NATIONAL/INTERNATIONAL CALENDAR

The National Agricultural Library maintains a calendar as part of AgNIC at <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 sponsors informal monthly meetings for growers to discuss issues related to pesticide use reduction. Contact: Molly Johnson, (530) 756-8158, ext. 30, [molly@caff.org](mailto:molly@caff.org); or Merrilee Buchanan, (831) 761-8507, [merrilee@storypages.com](mailto:merrilee@storypages.com); [www.caff.org](http://www.caff.org)

## AUGUST

**30** *6th Annual UC Davis Conference for Environmental Health Scientists: Early Determinants of Adult Health, UC Davis*. Information: [www.envtox.ucdavis.edu/cehs/](http://www.envtox.ucdavis.edu/cehs/)

## SEPTEMBER

**8,9** *CT2004: 2004 Western States Conservation Tillage Conference*, UC West Side Research & Extension Center, Five Points, Calif. Free annual conference for farmers, researchers, ag support industry

representatives, NRCS, RCDs, other public agencies. Presentations, demonstrations on alternative tillage systems developed for Calif., Ariz., Ore. Day 2 tours of farms, demonstration sites. 17353 W. Oakland, Five Points, CA. Contact: Jeff Mitchell, [Mitchell@uckac.edu](mailto:Mitchell@uckac.edu), 559-646-6565; <http://groups.ucanr.org/ucct/>

**12-14** *Cultivating a Sustainable Agricultural Workplace conference*, Troutdale, Ore. Sponsors: Pacific Northwest Agricultural Safety & Health Center, U Washington; Western Center for Agricultural Health & Safety, UC Davis. Focus: how occupational health/safety can be integrated into sustainable agriculture practices; how research/outreach can help. Posters on research/intervention projects in ag worker safety/health or social aspects of sustainable ag encouraged; due Aug. 13. Information at <http://depts.washington.edu/pnash/conf04/index.html> or (800) 330-0827, [pnash@u.washington.edu](mailto:pnash@u.washington.edu).

**29-29** *Society for Vector Ecology annual meeting*, Boston. More information at SOVE Web site: [www.sove.org](http://www.sove.org); 909-340-9792, [sove@northwestmosquitovector.org](mailto:sove@northwestmosquitovector.org)

## OCTOBER

**2-7** *International Congress of Vector Ecology*, Reno, Nev. More information at Society of Vector Ecology Web site: [www.sove.org](http://www.sove.org); 909-340-9792, [sove@northwestmosquitovector.org](mailto:sove@northwestmosquitovector.org)

**19-21** *USDA Northeast Sustainable Agriculture Research & Education (SARE) program conference*, Burlington, Vermont. Focus on regional food systems, with workshops on marketing, ecological production, policy/planning, farmer profiles & poster sessions, communications in the ag community. Farm tour Oct. 19, presentation of Patrick Madden Award honoring outstanding farmers. More information at <http://www.uvm.edu/~nesare/index.html>.

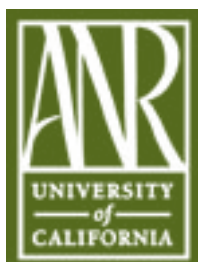
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