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Appendix 2: Programs and Facilitates

UC SUSTAINABLE AGRICULTURE RESEARCH & EDUCATION PROGRAM

Statewide Program
UC Sustainable Agriculture Research & Education Program www.sarep.ucdavis.edu

Director, Affiliation
Dr. Thomas P. Tomich,
Director, UC Sustainable Agriculture Research & Education Program
Director, UC Davis Agricultural Sustainability Institute
W.K. Kellogg Endowed Chair in Sustainable Food Systems
Professor, Dept of Human & Community Development & Dept. of Environmental Science & Policy

Staff in Program
Two academic coordinator positions and Communications Coordinator position (have been filled this year), Program Manager, Budget and Finance Officer, Project Assistant, Executive Assistant

General Issues and Programs
- Sustainable crop and livestock production: Competitive grants and direct research and education in program areas including…
  - Biologically Integrated Farming Systems (BIFS): competitive grants and direct participation in on-farm demonstrations and collaborative models of outreach and extension to help growers enhance environmental quality while maintaining yields and profits.
  - Organic farming
  - Key practices such as use of cover crops
  - Alternatives to Methyl Bromide
- Sustainable community food systems: competitive grants, direct research and outreach in direct marketing, regional food systems, and farm-to-school and farm-to-institution projects.
- Collaborative partnership models to support the diffusion and implementation of sustainable agriculture practices (over 200 participants @ March 2001 conference).

Significant Programmatic Impacts – 1998-2009
- Through SAREP's competitive grants programs and other partnerships, SAREP has engaged an expanding network of collaborators that include a broad range of organizations and agencies (e.g. Community Alliance with Family Farmers, CA Institute for Rural Studies, Ecological Farming Association, Organic Farming Research Foundation, CA Dept. of Pesticide Regulation, U.S. Environmental Protection Agency, Region 9, USDA SARE). These established relationships greatly enhance our ability to reach a growing base of stakeholders.
- SAREP disseminated information on sustainable agriculture through our content-rich Web site (generated over 2 million page requests per year for the last 3 years), *Sustainable Agriculture* newsletter (reached ~ 4,000 people 3X/year), media releases (typically over 10/year, often reaching national media outlets such as NPR, NYTimes, LATimes), publications, and staff presentations to a broad range of audiences.
- BIFS projects introduced farming systems concepts to farmers and demonstrated and documented to successful use of reduced risk practices to farmers throughout the state in ten different commodities. Many direct benefits to farmers; for instance, dairy producers working with the dairy BIFS project were able to save an average of $55/acre by optimizing the use of manure on their forage crops. http://ucanr.org/delivers/impactview.cfm?impactnum=207
- SAREP played a key role in the development and articulation of the concept of "sustainable community food systems." Produced studies of community food systems now used as statewide and national models; developed methodology for quantitative evaluation of farm-to-school programs. www.sarep.ucdavis.edu/cdpp/
- As state leader for the Western Region SARE's Professional Development Program, increased the capacity of CE advisors, NRCS field staff, and other agricultural professionals to apply the principles of sustainable agriculture with their clients. www.sarep.ucdavis.edu/wsare/
- SAREP-funded grants often provided seed funding that enhanced the establishment of community-based programs (e.g. Center for Land-Based Learning http://www.landbasedlearning.org/).
- Organic farmers in 11 counties received direct assistance from new UCCE county positions initially established from external funds secured by SAREP.

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UC RUSSELL RANCH SUSTAINABLE AGRICULTURE FACILITY

UC Davis Program
Russell Ranch Sustainable Agriculture Facility (http://russellranch.ucdavis.edu/, http://safs.ucdavis.edu/)

Director, Affiliation
Dr. Kate M. Scow
Director, Russell Ranch Sustainable Agriculture Facility
Professor of Soil Science and Microbial Ecology, Dept of Land, Air and Water Resources, UC Davis

Staff in Program
Facility Manager, Research Manager, Postgraduate Fellow, Field Technician, Undergraduate Research Assistant

General Issues and Programs

- Russell Ranch is a unique 1500 acre university-based facility that includes 300+ acres dedicated to investigating dry-land agriculture in a Mediterranean climate. The large scale plots permits use of field-scale equipment and provides multiple, replicated treatments. Ongoing experiments at Russell include:
  - Long Term Research in Agricultural Sustainability (LTRAS) (60 acres), since 1993, measuring long-term impacts of crop rotation, farming system (conventional, organic, mixed) and inputs of water and nitrogen on productivity, economic return and environmental impacts. Sustainability is indicated by long-term trends in yield, profitability, efficiency in use of limited resources (such as water or energy), and environmental impact. Changes in soil properties (organic matter fractions, pH, salinity), biology (microbes, nematodes), as well as economic indicators, are monitored to identify indicators for sustainability.
  - Sustainable Agriculture Farming Systems (SAFS) combined with LTRAS in 2002 to continue research on impacts of farming systems and reduced tillage practices on agronomic and soil properties, runoff, and economics.
- Plans to expand include development of perennial, dairy and rangeland systems. Russell Ranch includes part of the Putah Creek Natural Area with potential to explore linkages between natural and agricultural lands.

Significant Programmatic Impacts – 1998-2008

- Tomato yields in conventional, low-input and organic systems were similar during the first 14 years. Corn yields, were significantly lower in low-input and organic systems and showed a decreasing trend in those systems.
- Cover cropped systems retain more winter precipitation, and eliminate winter runoff to a greater extent than fallow systems and can be managed to store water with early cover crop incorporation. Cover cropped soils have higher infiltration rates than conventional soils, requiring larger inputs of irrigation water. Furrow irrigation is not optimal for organic agriculture because enhanced infiltration leads to high water use and percolation.
- Reduction of tillage in the low organic matter soils of Russell Ranch has led to compaction and promotion of soil sealing which can increase runoff compared to standard tillage systems. Despite this, reduced tillage substantially reduces fuel use. The type of irrigation system (furrow vs sub-surface drip) had little impact on emissions of nitrous oxide, a greenhouse gas associated with agriculture, unless winter cover crops were present, in which case drip reduced emissions.
- Higher organic carbon inputs to soil led to increasing soil carbon sequestration for up to 5-7 years and a particular organic matter fraction was identified as an early indicator for soil carbon sequestration.
- Investigations of food quality reveal that concentrations of flavonoids (plant secondary metabolites that may have a role in the prevention of human cardiovascular and other chronic diseases) are significantly higher in organically than conventionally grown tomatoes.
- Soil food webs are influenced by farming system and tillage. Organic management increases microbial biomass and leads to shifts in microbial community composition when compared to properties under conventional management. Soil fauna (mites, nematodes) are more diverse in no till than tilled plots.
- Collaborations with agricultural equipment manufacturers to adapt to reduced tillage practices to California's climate and soil have led to development of new equipment. Equipment demonstrations at Russell Ranch led local growers to modify their existing equipment and purchase new equipment based on our designs.
- Russell Ranch-SAFS has hosted annual field days every year 1996-2008. Russell Ranch produces a newsletter three times a year that reaches approximately 1250 recipients. The SAFS website provides up-to-date newsletters, press reports and a presentation on improving agricultural runoff management.

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UC DAVIS STUDENT FARM

Campus-based Program
UC Davis Student Farm http://studentfarm.ucdavis.edu/

Director, Affiliation
Mark Van Horn
Director, UC Student Farm
Lecturer, Department of Plant Sciences

Staff in Program
Two Academic Coordinator positions, Senior Agricultural Technician, Program Representative, several undergraduate and graduate students

General Issues and Programs

- Hands-on experiential learning in sustainable agriculture, ecological horticulture, environmental education through internships, courses, and volunteer and paid student positions in programs including:
    - Market Garden –organic crops grown and sold on campus via CSA, Coffee House and farmers' market
    - Ecological Garden – a highly diverse garden site for learning ecological horticulture and related topics
    - Children's Garden Program – UC Davis students host tours for regional school children and parents
    - Compost Projects – farm and garden scale composting, including all kitchen waste from the campus
- Contributions to formal courses and curricula including offering classes in sustainable agriculture, garden-based learning and organic crop production and helping develop and deliver new sustainable agriculture major.
- Support for student-led projects, including undergraduate and graduate research and demonstration projects focused on aspects of sustainable agriculture and food systems and educational efforts by student groups.
- Outreach/public service to diverse audiences such as farmers exploring more sustainable practices, master gardeners, children and youth and those who work with them (e.g. via garden-based education).

Significant Programmatic Impacts – 2000-2009

- Helped coordinate the development of nearly $2M of new classroom, greenhouse and shop facilities and other improvements to our teaching gardens, fields and equipment. This increased the number of courses utilizing the Plant Sciences Teaching Center and Student Farm from less than five in 2000 to approximately 25 in 2009. These courses serve about 800 students annually, including roughly 350 students whose courses include both classroom and field activities at the facilities.
- Children's Garden Program (CGP) provided tours to over 20,000 children, teachers and parents and expanded to provide workshops, educational materials and other services to teachers, school food service providers and others involved in garden-based education. Now the CGP is one of the leading garden-based learning programs in California, providing services to schools and educators throughout the state and conducting research on the efficacy of these educational programs.
- The Market Garden (MG) strengthened its experiential learning opportunities for students. The MG is used extensively in courses such as PLS 49, Organic Crop Production Practices, which was first offered in 1998 and now is offered twice annually. The MG's productivity has more than doubled and its marketing outlets have expanded from two to four (all on campus).
- Helped shepherd development of new Sustainable Agriculture and Food Systems major. In 2008/2009, started providing support for laboratory activities for three of the major's core courses and the SF Director/Lecturer began teaching one of those core courses. Continuing to participate in the development of various aspects of the major and shepherd the major proposal through the approval process.
- Provided support for, and collaborated with, student efforts such as Project Compost and Students for Sustainable Agriculture. These groups have helped educate the UC Davis community about sustainable agriculture and food systems and promote and enhance the sustainability of the campus food system.
- Organized, in collaboration with UCSC, first national conference on post-secondary sustainable agriculture education in 2006, leading to development of national Sustainable Agriculture Education Association (SAEA) and currently serving a leadership role within SAEA.

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NEW SUSTAINABLE AGRICULTURE AND FOOD SYSTEMS UNDERGRADUATE MAJOR

Program
Sustainable Agriculture and Food Systems - Bachelor of Science Major (approval pending)
http://asi.ucdavis.edu/undergradcurriculum.htm

Contact

Damian Parr	Mark Van Horn
Postdoctoral Fellow	Director, Student Farm
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Summary

- The major is designed to develop students' professional and civic competencies through a wide diversity of knowledge, skills and experiences using traditional and nontraditional teaching methods, including hands-on and group-based experiential learning activities.
- The major is founded on several innovative features:
    - Interdisciplinarity
    - Systems thinking
    - Skill development
    - Experiential learning
    - Community building
    - Adaptive management
- All students will take courses in a broad range of disciplines but each will focus their studies within one of three tracks: *Agriculture and Ecology, Food and Society, or Economics and Policy.*
- The curriculum is built around common preparatory core courses, which allow students to develop a shared knowledge base and community of practice. They are:
    - *Introduction to Sustainable Agriculture* (PLS 15)
    - *Food Systems* (CRD 20)
    - *Sustainability and Agroecosystem Management* (PLS 150)
    - *Economics of Agricultural Sustainability* (ARE 121)
    - *Capstone: Workshop on Food System Sustainability* (ESP 191 A, B)
- The preparatory classes in each of the three tracks provide basic disciplinary training in both natural and social sciences and some humanities. In upper division classes, students continue their studies focusing on one of the three tracks, and can choose from several topical areas of interest.
- The major places an emphasis on the development of practical skills that can be applied to career opportunities throughout the agriculture and food system. All students will have direct experiences in food production activities through the applied production courses and possibly though other avenues.
- Students also will participate in internships, focusing on off-campus experiences within diverse segments of the agriculture and food system. This may include working on farms or in food businesses, with government agencies or non-profit organizations, domestically and internationally.

Significant Programmatic Impacts

- First UC Davis major focusing on sustainability.
- Broadly interdisciplinary: faculty hired as part of ASI initiative in eight departments will teach in the major.
- Innovative curriculum: major provides an integrated model of experiential learning that synthesizes theoretical and practical knowledge, class work and field work, through lectures, team-based labs and workshops, and internships, on and off campus.
- Strong student interest: some students can't wait and are using the 'individual major' option until the major is approved. Students have and will continue to play important roles in helping shape the curriculum.
- $219,000 in funding has been obtained to support development of the new major.
- $100,000 endowment gifted by the Constant van Vlierden Estate to support a scholarship program.
- Major has been submitted to the College of Agriculture and Environmental Sciences faculty for approval.
- All the core courses for the major, except *Capstone*, are in their 2nd year of being offered (2009-2010). This fall quarter's *Food Systems* course has seen > 50% increase in enrollment to 35.
- The *Capstone* - will be offered in 2010 or 2011
- Estimate an initial cohort size of 30 and eventually at least 125 students in the major over the four-year term of study.
- Core course labs are creating linkages to sustainable agriculture and food system communities regionally. Internship program will broaden and deepen these linkages to include national and international communities.

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AGROECOLOGY AREA OF EMPHASIS WITHIN THE ECOLOGY GRADUATE GROUP

Program
Agroecology Graduate Studies

Contact

Chris van Kessel	&	Johan Six
Chair Department of Plant Sciences		Associate Professor in Agroecology
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Summary
The Agroecology program, one of the degree options in the Graduate Group in Ecology at UC Davis, seeks graduate students with a particular interest in three major areas of research:

- Study of agricultural organisms, populations, communities, and their interactions at a systems level, in order to determine how ecological principles operate in agricultural systems across the globe.
- Comparison of ecological and evolutionary processes in agricultural and natural ecosystems, and use of these comparisons to understand the major similarities and differences between agricultural and natural ecosystems within the US and abroad.
- Combining ecological principles with agronomic practice to manage temperate and/or tropical agricultural systems for sustainable production, improved resource conservation, and minimized environmental impact.

Agricultural ecology encompasses many diverse disciplines, interests and emerging problems, including the need to address growing pest and weed control problems, protect farmworker health, reduce pressure on supporting natural resources, ameliorate environmental impacts of agricultural operations and promote sustainable agricultural production around the world. As a truly integrative and interdisciplinary science, agricultural ecology is unique in its scope of inquiry. Areas of research and application range from the physiological, population, and community ecology of organisms present in agroecosystems to the connection between different systems within the farming scape and their regional and global impact on land, water and atmospheric resources. Agricultural ecology is also concerned with systems of agricultural production and management, including socio-economic aspects, farmer/research relations and extension.

The impact of agriculture on human society and the natural world raises some of the most important and imminent issues that we will face in the next century. The Agroecology program is approaching many of the most pressing questions and problems in agriculture through the application of ecological knowledge and research techniques. This synthesis of research and application at multiple scales across traditional disciplines provides a context for relevant and exciting study at the crossroads of natural and human-dominated ecological systems.

Significant Programmatic Impacts

- The Agroecology program is in a unique position to take advantage of a synergistic relation between ecology and agriculture. Combining a wide base of resources from world renowned university programs in agriculture and ecology, the Agroecology program is leading the way for new applications of ecological studies in agricultural systems.
- Research in the Agroecology program emphasizes the role ecology can play in increasing our understanding of processes at many levels of agricultural systems (e.g., weed-pest-crop interactions or soil microorganisms and chemical transformations in the soil column).
- The program is interested in identifying common ecological processes underlying both agricultural and natural systems across the globe, and examining how agricultural systems can be integrated with natural systems (e.g., spatial scaling and stability in ecosystems, ecotones promoting multiple functions in agroecosystems).
- Ecological modeling is encouraged to provide insight into problems facing modern agriculture and research results obtained in agricultural systems could make unique contributions to improved understanding of other ecological systems and principles.

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UC DAVIS STUDENTS FOR SUSTAINABLE AGRICULTURE (SSA)

Program
Students for Sustainable Agriculture http://cce.ucdavis.edu/content/view/18/36, http://sustainableaggies.blogspot.com/

Contact
Maggie Lickter & Margret Worthington
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Summary

- The SSA works to engage the campus and larger community in a socially just and ecologically balanced approach to agriculture.
- Members include graduate and undergraduate students, professors and community members interested in changing our food system.
- SSA employs a variety of methods to reach out to UC Davis and the local community:
    - Connect communities through the celebration of food
    - Integrate practice and theory to promote ecosystem and human health
    - Empower students
    - Utilize local resources and knowledge
    - Support both interdisciplinary and experiential education
    - Advocate research pertinent to sustainable agriculture
    - Stimulate innovative and accessible public outreach in the greater community
    - Facilitate discussion among diverse viewpoints and perspectives
    - Support the greater community of farmers, farm workers, and consumers
- Projects:
    - UC Davis Local Food Week
    - Real Food Challenge
    - Olive Harvest
    - Fruit Gleaning
    - President Elect – Obama, letter of action
    - Student Farm Support and Outreach
    - Participation in California Student Sustainability Coalition convergences
    - Labor and Social Justice Issues - Statement on Food Service Employees (for the recent Sodexo worker's labor and social justice campaign)

Significant Programmatic Impacts
- The listserv reaches out to 320 members of the community, providing information on events, projects, employment opportunities, and topical issues.
- SSA uses social media to connect with people in innovative ways – http://www.facebook.com/home.php#/group.php?gid=4956137697&ref=ts, http://sustainableaggies.blogspot.com/
- Members of SSA participate on ASI's Internal Steering Committee and External Advisory Board.
- Local Food Week – held in the Fall and Spring Quarters; engages students, staff, faculty, and community in understanding where their food comes from; collaborating with ASUCD Coffee House for taste testing of local food and profiling local food found in the Coffee House; collaborating with University Dining Services for educational support at the Farm-to-College theme meals.
- Real Food Challenge – supporting the national campaign to redirect 20% of all food purchased by colleges and universities (currently 4 billion dollars) towards real food by 2020 - http://realfoodchallenge.org/
- University Dining Services support – meeting with dining services directors and managers to help move towards a more sustainable food system; engaging them in the Real Food Challenge.