

California Agriculture

SPECIAL SECTION 2014



*100 Years of
Science and Service*



ANR and Cooperative Extension touch people's lives

During my first months as president of the University of California, I traveled around the state, educating myself on the workings and wonders of the UC system. One of my goals was to learn how the university serves the people of California and what we can do to enhance that public service.



Janet Napolitano
President, University of California

At every stop, I saw outstanding examples of the ways UC enriches the lives, and livelihoods, of Californians. I visited labs where they're mapping the human brain, developing new battery technologies for electric and hybrid cars and studying ways to eradicate malaria. I was impressed with how UC's research discoveries not only drive the state's economy but also create opportunities for people who live far beyond California's borders. I developed a motto to capture the essence of what UC does: "Teaching for California, researching for the world."

UC's Division of Agriculture and Natural Resources (ANR) has its own mantra: "California roots, global reach." They both promote the same principle — we are dedicated to serving California and that service has impacts throughout the world.

One of the most profound ways in which UC touches people's lives is through the work of ANR and Cooperative Extension. Whether you are a backyard gardener or a major grower in the Central Valley, a

devotee of the California food and wine revolution or someone who simply strives to put nutritional meals on the table, chances are you have benefited from ANR, its research stations and the thousands of Cooperative Extension staff operating throughout the state.

Moving forward

I am proud to be a part of this great enterprise of public service, especially during the centennial year of the founding of the national Cooperative Extension system. As our nation celebrates this milestone, it is an appropriate time to honor the history of UC's agricultural roots and to move forward with new ways of serving California.

To that end, I am making a change that will accomplish both at once. Historically, the ANR vice president reported directly to the UC president, just as the campus chancellors do. In recent years, the division was put under the umbrella of the Office of the Provost. It is time to restore ANR to its traditional place in the administrative structure of the university. Accordingly, ANR will once again report directly to the president. I believe this change properly reflects the importance of the work ANR does for the UC system and the state of California. It will ensure that agricultural issues remain front and center to the work of the University of California and will allow me to stay in better touch with the agricultural community.

Deep roots

As a land-grant university, UC has always had a mandate to educate people in the latest agricultural methods. From the earliest days of the university, that was part of our mission.

When the Smith-Lever Act of 1914 created the national Cooperative Extension system, UC's mission expanded. The name Cooperative Extension itself embodies what that mission was intended to be and what it has evolved into.

"Extension" in this sense means reaching out and sharing the scientific knowledge of the university with the public. "Cooperative" is the key concept that makes these endeavors successful. With federal support, UC Cooperative Extension (UCCE) thrives as a partnership of growers, ranchers, state and local government and a committed community of ANR scientists, educators and employees. Together, this partnership has built California agriculture into a \$45 billion industry.

In celebration of the 100th anniversary of Cooperative Extension, this issue of *California Agriculture* highlights some of the many UCCE



contributions to California. In these pages, you can read how a Fresno County CE advisor helped alfalfa seed growers stave off infestations of Africanized bees and increase crop yields.

In another example of the value of partnerships, you can learn how an advisor, a grower, an agriculture commissioner and a retired army officer teamed up to create a popular tourist destination and apple-growing region in a Northern California community whose orchard livelihood once faced extinction.

These are just two examples of how UCCE has come through in a crisis. Every day, its researchers and advisors apply scientific innovations to the challenges of increasing yields, battling invasive pests and diseases, reducing energy use, conserving water, breeding new crop varieties and developing sustainable farming methods.

Over the years, the Cooperative Extension mission has evolved with the times, and it will keep evolving. For example, during World Wars I and II, UCCE helped Californians plant victory gardens to increase the wartime supply of fresh produce. Today, UCCE runs Master Gardener programs in 45 counties, teaching people to enrich their homes and communities with sustainable, edible and ornamental gardens.

California 4-H still provides young people with the opportunities to raise livestock and compete at county fairs. Now, its programs have expanded to include technical knowledge with robot-building competitions and computer training classes.

Particularly noteworthy is the role UCCE and ANR play in building healthier communities. Through nutrition programs in underserved rural and urban neighborhoods, UCCE is fighting obesity, diabetes, high blood pressure and other chronic conditions

related to diet. These efforts benefit all Californians by helping curb rising health care costs.

Critical responses

With every crisis California faces, UCCE comes through with practical, on-the-ground solutions. With our state now facing a drought, ANR is committed to using its expertise to help our agriculture industry survive. We all know California is no stranger to the cycles of dry years and water rationing. ANR advances in irrigation, plant breeding and conservation methods helped our state survive droughts of the past. And we can do it again.

Climate change is the latest challenge in the water shortage difficulties facing our state. The effects of a warming environment on California's fields, forests and wildlife has risen to the top of the University's research concerns. While UC scientists study the causes and effects of climate change, UCCE will be applying that knowledge to technological innovations that will supply California with the latest drought survival strategies.

Advocating

A few months ago, I met with the President's Advisory Commission on Agriculture and Natural Resources for the first time, and I'm looking forward to meeting with that group again in April. I plan to work closely with its members to ensure that ANR has the tools to meet the needs of California.

When I was appointed UC's 20th president, I pledged to be the best advocate possible for the University of California. I am eager to be a partner with — and advocate for — ANR and all its valuable programs. In essence, that means I will be an advocate for California agriculture.

I'll be looking for opportunities to talk about all the ways the ANR family makes life better for California families. Don't be surprised if I call on you to help spread the word.



I am proud to be a part of this great enterprise of public service, especially during the centennial year of the founding of the national Cooperative Extension system.

Rebuilding for the next 100 years

Barbara Allen-Diaz
Vice President
Division of Agriculture and Natural Resources
University of California

In 2014 our nation commemorates the 100th anniversary of the founding of Cooperative Extension. For the University of California's Division of Agriculture and Natural Resources (ANR), this is both a year for celebration and for renewal.

As California's land-grant research university, UC, in 1914, was given the task of building the Extension

system that the Smith-Lever Act envisioned would propel U.S. agriculture into the modern era. UC ANR embraced that vision with a prophetic belief that scientific knowledge could, indeed, transform California into the world's most successful agricultural producer.

For 100 years, UC Cooperative Extension has served as ANR's "community ambassador," delivering research and education programs in every California county. During this centennial year, we have much to celebrate, thanks to our storied history and the 1,350 dedicated individuals who make UC Cooperative Extension and all of ANR thrive.

Today, we operate nine Research and Extension Centers, 60 county offices and three administrative centers, with more than 11,000 acres, 320 Extension researchers and 650 campus-based academics devoted to sustaining and improving California's

agricultural and natural resources.

Through this vast statewide network, ANR delivers practical, science-based information to California growers, ranchers, decision makers and, perhaps most importantly, the people of California.

Through our partnerships with the agricultural community; state, local and federal agencies; and the California State University, we address some of the most pressing problems of our day, including

- researching how to make safe, affordable food available to the world's 7 billion people;
- protecting scarce natural resources;
- building healthy, prosperous communities; and
- educating our future leaders to meet these and tomorrow's challenges.

In many ways ANR functions as UC's 11th campus. We don't grant degrees, but we educate more than 150,000 California young people every year in the California 4-H Youth Development Program.

One of the original Cooperative Extension programs, 4-H teaches science, engineering, nutrition, ecology and good citizenship. By participating in 4-H, young people increase their likelihood of graduating from college fivefold.

ANR doesn't operate medical centers, but we work every day to fight childhood obesity and poor nutrition. Our Extension nutrition programs reach more than 222,000 adults and children in 33 counties.

Through UC Cooperative Extension's efforts, over the past three decades California's milk production has increased 44%; its processing tomato yields have increased 69% and almond yields have risen by 122%.

Using ANR-developed technology, California growers save 100,000 acre feet of water a year.

When invasive pests like the Asian citrus psyllid attack crops, ANR fights back with scientific advances in pest management and ongoing research to eradicate the threat.

Even in times of severe budget cutbacks, ANR consistently fulfills its public service responsibilities. The university and ANR have suffered through chronic funding declines that have threatened the quality of our programs and ability to serve the state. Now that California's finances are improving, we must focus on renewal.

Among my highest priorities as vice president is to rebuild the academic footprint of UC Cooperative Extension. To sustain UC's credibility with the people it was created to serve, we must continue to replenish our ranks (see next page) and revitalize programs trimmed during lean budget years.

We also must forge new public-private partnerships and strengthen the ones we have to attract diversified funding sources to our programs.

And we must build collaborations within the UC campuses to take advantage of the multidisciplinary nature of transformative research.

These are some of the challenges that keep me awake at night. We must accomplish these goals and more if UC Cooperative Extension and all of ANR are to contribute another 100 years to the health and vibrancy of the California we all treasure.

For 100 years, UC Cooperative Extension has served as ANR's "community ambassador."



UC ANR researcher checking codling moth trap in a walnut tree at sunrise

Replenishing ANR's Cooperative Extension academic ranks

The following academic personnel have joined UC ANR since July 2012.

Oli Bachie

Advisor; Imperial, Riverside and San Diego counties

Rob Bennaton

Advisor; Alameda, Contra Costa, San Francisco, San Mateo and Santa Clara counties
Director; Alameda and Contra Costa counties

Dustin Blakey

Advisor and Director; Inyo and Mono counties

Virginia Bolshakova

Advisor and Director; San Francisco and San Mateo counties
Director; Elkus Ranch

Gurreet Brar

Advisor; Fresno and Madera counties

Lyn (Rebecca) Brock

Academic Coordinator; UC Nutrition Education Professional Development Program

Sandra Derby

Academic Coordinator; California Project Learning Tree Program

Ryan DeSantis

Advisor; Shasta, Siskiyou and Trinity counties

Dorina M. Espinoza

Advisor; Del Norte, Humboldt, Lake and Mendocino counties

Jim Farrar

Director; Western IPM Center

Julie Finzel

Advisor; Kern, Kings and Tulare counties

Lisa Fischer

Associate Director; Research and Extension Center System

Missy Gable

Director; Statewide Master Gardener Program

Latonya Harris

Academic Coordinator; Youth, Families and Communities Statewide Program

Russell Hill

Advisor; Madera, Mariposa, Merced and Stanislaus counties

Anne Iaccopucci

Academic Coordinator; 4-H Healthy Living Initiative

Jeremy James

Specialist and Director; Sierra Foothill Research and Extension Center

Shimat V. Joseph

Advisor; Monterey, San Benito and Santa Cruz counties

Susie Kocher

Advisor; Amador, Calaveras, El Dorado and Tuolumne counties

Igor Lacan

Advisor; Alameda, Contra Costa, San Francisco, San Mateo and Santa Clara counties

Michelle Leinfelder-Miles

Advisor; Contra Costa, Sacramento, San Joaquin, Solano and Yolo counties

Dani Lightle

Advisor; Glenn County

Bruce Linquist

Specialist; Department of Plant Sciences, UC Davis

Mark Lundy

Advisor; Colusa, Sutter and Yuba Counties

Fadzayi Mashiri

Advisor; Madera, Mariposa and Merced counties
Director; Mariposa County

JoLynn Miller

Advisor; Amador, Calaveras, El Dorado and Tuolumne counties

Maurice Pitesky

Specialist; Department of Population Health and Reproduction, UC Davis School of Veterinary Medicine

Lorrene Ritchie

Specialist and Director; Nutrition Policy Institute

Drusilla Rosales

Advisor; Los Angeles and Orange counties

Samuel Sandoval Solis

Specialist and Assistant Professor; Department of Land, Air and Water Resources, UC Davis

Noelia Silva-del-Rio

Specialist; Department of Population Health and Reproduction, UC Davis School of Veterinary Medicine

Christopher Smith

Director; Ventura County
Director; Hansen Research and Extension Center

Martin Smith

Specialist; Department of Human Ecology and UC Davis School of Veterinary Medicine

Katherine Soule

Advisor; San Luis Obispo and Santa Barbara counties

Alex Souza

Advisor; Kern and Tulare counties

Jeffery Stackhouse

Advisor; Del Norte and Humboldt counties

Kristen Stenger

Advisor; Fresno and Madera counties

Andrew Sutherland

Advisor; Alameda, Contra Costa, San Francisco, San Mateo and Santa Clara counties

Kris Tollerup

Advisor; Kearney Agricultural Research and Extension Center

Julia Van Soelen Kim

Advisor; Marin, Mendocino, Napa and Sonoma counties

Guangyao "Sam" Wang

Specialist and Director; Desert Research and Extension Center

UC Cooperative Extension history

A century of science and service

Rose Hayden-Smith, UC Cooperative Extension 4-H Youth, Family and Community Development Advisor, Ventura County

Rachel Surls, UC Cooperative Extension Sustainable Food Systems Advisor, Los Angeles County

On a warm Friday, May 8, 1914, in Washington D.C., two pieces of new legislation awaited President Woodrow Wilson's signature: a proclamation establishing the second Sunday each May as Mother's Day, and the Smith-Lever Act. The honoring of mothers dominated the news that day, but Wilson recognized the importance of the Smith-Lever Act, calling it "one of the most significant and far-reaching measures for the education of adults ever adopted by government."

Sponsored by Sen. Hoke K. Smith and Rep. Asbury F. Lever, the bill was the result of national efforts to create a new educational model for U.S. agriculture. At that time, land-grant universities ran farmers institutes and short courses taught by lecturers, and the U.S. Department of Agriculture (USDA) offered its own form of Extension work that focused on pest control field demonstrations in the South and farm

management in the North. Yet there was no consistent or efficient way to deliver important knowledge from the university campuses to the communities that needed it. Passage of Smith-Lever launched a century of innovation in U.S. education that continues to this day. In California, the educational model born out of the legislation is UC Cooperative Extension. For 100 years this statewide network of UC researchers and educators has developed and provided science-based information to solve locally relevant challenges in the areas of economics, agriculture, natural resources, youth development and nutrition.

Progressive roots

Agriculture has always been vital to America. In 1860, at the outset of the Civil War, farmers made up 58% of the U.S. labor force. It was that demographic that created the impetus behind the 1862 Morrill Act, which gave each state a grant of land to establish a college that would teach practical subjects such as agriculture and engineering (see *California Agriculture*, April-June 2012, pg. 42). A key role of those

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California milestones



Library of Congress

1862

President Lincoln signs Morrill Act, authorizing development of agricultural "land-grant" colleges in each state

1887

Hatch Act establishes federal funding for agricultural research in state land-grant colleges

1913

Andrew Hansen Christiansen named California's first Extension farm advisor, placed in Humboldt County

1912

UC agricultural clubs formed in Ferndale and Fortuna; these early clubs evolved into today's 4-H program



1919

B.H. Crocheron recruited to direct state's Agricultural Extension Service, which he does for next 35 years

1918

First UC Extension specialist, a poultryman, hired with goal to double egg production from 80 eggs per hen per year average

1900

1880

1860

1868

University of California founded to teach "agriculture, mining and the mechanical arts"



The Bancroft Library, UC Berkeley

1914

Congress passes the Smith-Lever Act, making federal funds available for extension work

1915

UC Agricultural Extension Service (later renamed "Cooperative Extension") appoints farm advisors in Glenn, Solano, Stanislaus and Placer counties



Library of Congress

1917

Emergency war appropriations provide growth for UC Agricultural Extension as "food for victory" becomes national priority

The presidential roots of Cooperative Extension

Over the course of more than half a century, Presidents Abraham Lincoln and Woodrow Wilson signed bookend legislation that created the land-grant institutions and Cooperative Extension. Despite very different backgrounds and political ideologies, they reached very similar conclusions about the vital nature of agricultural education to U.S. prosperity.

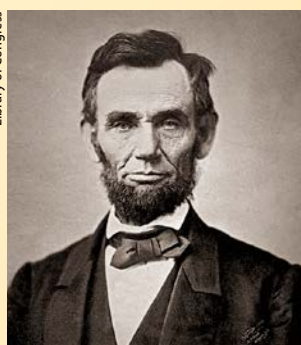
President Lincoln, a Republican, who signed into law the Morrill Act, creating the nation's system of public higher education and land-grant institutions, and President Wilson, who signed the Smith-Lever Act, which created the Cooperative Extension service, were

both shaped by the American Civil War. Lincoln experienced the war firsthand, serving as president of the United States when the South seceded from the Union, and brought the nation intact, although battered, through 4 grueling years of war. Lincoln was born and raised on a farm, and his lack of formal education influenced his ideas about educational access for Americans. Life on the farm also influenced his ideas about the importance of

creating a federal-level agency (the USDA, what Lincoln termed "the people's department") to manage agriculture, of opening up land to settlers by means of the Homestead Act, and of creating a transnational railroad system to promote commerce.

A Democrat, Wilson was born in Virginia. At the end of the Civil War, when he was only 8 years old, he watched the former Confederate president, Jefferson Davis, brought through his community in chains. As a youth he saw how local farmers struggled after the war. He attended elite educational institutions, including the University of Virginia and the College of New Jersey (later renamed Princeton University), and received a doctorate from Johns Hopkins University. Wilson was the first president to ride to his inauguration in an automobile. He never forgot his firsthand observations of the economic challenges Southern farmers faced in the post-Civil War era; these experiences strongly influenced his ideas about scientific agriculture and the importance of Extension education.

Library of Congress



President Abraham Lincoln

Library of Congress



President Woodrow Wilson



1920

Crocheron establishes week-long traveling conferences where caravans of farm advisors and Farm Bureau representatives travel for hundreds of miles viewing selected farms.

Farm Bureau centers established in more than 500 rural communities



1922

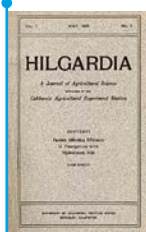
Growers begin acquiring tractors; UC Extension holds one-week schools in 12 counties teaching growers how to adjust and repair their new machinery

1924

Extension workers help bring an outbreak of foot and mouth disease under control

1925

Hilgardia, a monographic series of agricultural science, begins



1929

Extension provides emergency assistance when St. Francis Dam break inundates portions of Ventura and Los Angeles counties

Extension Director Crocheron embarks on fact-finding tour in Asia to investigate potential markets for California specialty crops; his outlook is not optimistic

1927

Extension academics begin specializing in poultry, dairy, citrus, walnuts, agricultural engineering, etc.

1920

1921

Volunteer leader concept implemented for high school boys' and girls' agricultural clubs organized by farm advisors, forming the basic structure and philosophy for today's 4-H Youth Development Program

1923

Extension completes first decade with 40 farm advisors, 33 assistant farm advisors and 21 home demonstration agents in county offices

1926

First Agricultural Extension circulars published



1928

"4-H" appears for the first time in California reports on youth work

UC Cooperative Extension history

colleges was to develop knowledge that would help farmers produce enough food and fiber to meet the needs of a growing nation.

In 1887, the Hatch Act was passed to further this mission; it provided land-grant colleges with funds to develop agricultural experiment stations, where research was conducted. Passage of the Adams Act in 1906 doubled funding to the research stations, while requiring a new funding commitment from state sources. The infusion of federal and state capital facilitated agricultural research, education and innovation, and generated increasing interest in U.S. agriculture among policymakers concerned about food security and increasing economic opportunities.

Five years of debate had preceded the Smith-Lever legislation. The McLaughlin Bill, proposed in 1909, left no clear role in Extension work for the USDA. Opponents of that bill were familiar with the work of early Extension educator Seaman A. Knapp and argued for his model, which emphasized demonstration work on farms. The final Smith-Lever legislation was a compromise, facilitated by USDA Secretary David Houston, that proposed a single Extension service from the USDA's agricultural

Extension system and land-grant education, and created a federal, state and county funding formula for it that persists to this day.

The intent of the Smith-Lever Act, like earlier agricultural legislation, was broadly democratizing. Initially, Extension focused on improving and reforming rural life, partly in response to the findings of the Country Life Commission, created by President Theodore Roosevelt in 1908. The Smith-Lever Act was rooted in the Progressive philosophy of helping people help themselves, a philosophy that continues to inform Cooperative Extension's work today, and it demonstrated Progressive Era beliefs in the value of public-private partnerships and shared funding models.

In the case of Cooperative Extension, the model included federal (USDA), state (land-grant universities) and local support (county funding, and the organization of a local Farm Bureau to sponsor the work). This relationship with the Farm Bureau was a vital component in Cooperative Extension's formation and identity; their growth and partnership has been

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1930

Focus turns to practical application of science to agriculture, with progress on soil fertility and new dusts and sprays to control crop diseases

1934

Severe drought hits California: 18 California counties declared emergency areas eligible for federal funds; farm advisors serve as government agents in purchasing livestock in the hardest-hit areas

1934

Extension tapped to help federal government implement and administer Agricultural Adjustment Administration programs to help growers stabilize their incomes

1938

Federal-state agreements establish pilot land-use planning program in U.S. counties; UC Extension monitors programs in Riverside, Kern, Sonoma and Yuba counties

1937

George B. Alcorn joins Extension as agricultural economist; he will become third director of California Agricultural Extension Service in 1956



1943

Extension asked to administer Emergency Farm Labor Project to assure adequate supply of workers for wartime agricultural production

1942

In response to Pearl Harbor, Extension agents organize Emergency Farm Fire Protection Project, forming more than 2,000 volunteer fire companies in 42 counties to thwart possible incendiary attacks

Director Crocheron organizes California Minute Men rural militia; 20,000 men sign up through county Extension offices to serve on reserve duty

1940

1940

Farm advisors and home demonstration agents lead wartime committees, conduct war bond campaigns and organize state militia that recruits more than 23,000 volunteers

1941

Victory gardens and rural fire protection become important Extension topics



Library of Congress

1930

1932
"Cal-Approved" seed program begins to ensure quality seed for standard and improved varieties

1935
With encouragement from a UC Extension forestry specialist, 2,000 miles of windbreak planted to effectively protect Southern California citrus districts



1936

Congress approves Soil Conservation and Domestic Allotment Act to conserve soil and prevent erosion; Extension agents given responsibility of carrying out organizing work

A profile in excellence

In the late 1930s and early 1940s, a young UC-trained agronomist named Milton D. Miller worked as an assistant farm advisor in the UC Cooperative Extension office in Ventura County. When the United States entered World War II, Miller enlisted in the U.S. Army as a captain and was deployed to the Pacific theatre. He worked for the U.S. Subsistence Procurement Branch in Australia, where he helped farmers transition from hand-hoeing vegetable fields to using mechanical weeders, as part of the effort to boost Allied war-time food production. An engaging writer, Miller corresponded regularly with the Cooperative Extension staff in Ventura, exchanging news and thanking them for gift packages that included fruitcake, handkerchiefs and tobacco.

After the war ended, Miller returned to service with UC Cooperative Extension, working as an Extension specialist from what eventually became the UC Davis campus. His notable career spanned more than 50 years, and his work in rice, cereal and oilseed crops, and food procurement had local, state, national and international impacts. Producers here and all over the world benefited from his research on rapidly developing technologies to improve practices and increase production.



Milton Miller (right) in a Tasmanian carrot seed production field during World War II, 1944.

Special Collections, General Library, UC Davis



1945

In response to newly formed Forest Service grazing restrictions, Extension advisors help ranchers determine most efficient locations and methods to feed cattle

1948

Extension Director Crocheron dies suddenly, ending an era; acting director Chester Rubel writes "... a deep understanding of rural problems, a genius for organization, and a devotion to agriculture and to rural people ... made [Crocheron] an outstanding leader. ... The foundations which he laid are sound and enduring ... His work will go on."



1956

UC Davis scientists and Extension farm advisors develop tomato varieties around state, identifying three new hybrids with superior yields

1950

Extension reorganizes to better cope with scientific and technical advances and with California's rapidly increasing population; home demonstration agents become home advisors; county director positions created to coordinate local farm and home advisor programs

New specialist positions added in range management, ornamental horticulture, subtropical horticulture, plant pathology, vegetable crops, deciduous fruits and nuts, agricultural engineering, marketing, extension education, 4-H, home economics, youth counseling, apiculture, biometrics, climatology, crops processing, forest products, nematology, parasitology, enology, pesticide safety, consumer marketing, wildlife management, public affairs, radio-TV, dairy products and soil and water salinity



1957

Extension farm advisors work on improving irrigation efficiency by applying water based on specific soils and crop needs

1955

Extension staff totals 549, more than double 1940's Extension workers

1950

1947

Seventy-eight new Extension agents hired

1953

Extension researchers study air pollution damage to various crops in Los Angeles Basin and San Francisco Bay Area

1954

UC Extension specialists coordinate with USDA to develop new shade structures for livestock in hot weather



1958

UC Extension entomologists release guidelines for growers on minimizing effects of pesticides on bees

1959

Extension agricultural economists study challenges and opportunities in California's rural-urban transition

1946

Sixty new Extension appointments made
California Agriculture journal begins publishing



UC Cooperative Extension history

Passage of Smith-Lever launched a century of innovation in U.S. education. In California, the educational model born out of the legislation is UC Cooperative Extension.

extraordinarily successful in advancing American agriculture. Local farmers and Cooperative Extension shared ownership in this shared model and the knowledge produced, and they still do.

What is difficult to comprehend today, 100 years later, is the sense of urgency surrounding the need

to improve U.S. agriculture in 1914. The nation's agricultural sector faced difficulties in a number of areas, including production, yield, labor sources and distribution. Rural areas were depopulating, and the number of farmers was dropping. At the same time, an inexpensive, secure and ordered food supply was believed essential for civil order and national progress.

1914 was a momentous year. The Panama Canal opened. Ford Motor Company established an 8-hour workday and increased wages. The National Guard fired upon striking miners in Colorado. Racial tensions ran high, as did tensions between rural and urban

populations. U.S. naval forces landed and occupied Veracruz, Mexico, bringing the two countries to the brink of war. By August, World War I had started, and U.S. agricultural products were sorely needed to feed and support our allies. Efficient agriculture backed by scientific solutions became a national priority.

Partners in California

Even before passage of the Smith-Lever Act in 1914, efforts were already under way to create an agricultural Extension system in California, building on the success of the state's land-grant college, the University of California. The first UC campus, at Berkeley, had agriculture as an important early focus. In 1907, a university research farm was opened in Davisville to serve Berkeley students. That site grew into a new campus, UC Davis. The same year, UC established the Citrus Experiment Station in Riverside, which was instrumental in helping California emerge as the nation's premier citrus producer, creating a second Gold Rush of sorts, as thousands flocked to the Golden State to capitalize on the opportunities that the state's agricultural and natural resource abundance

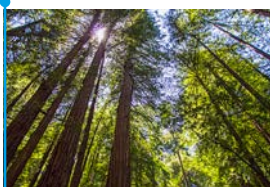
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1960

Extension efforts on advancing production agriculture improve farm productivity and mechanization

Home economics program reorganized as Family and Consumer Sciences

4-H programs developed in urban, low-income areas



1962

Experiment Station researchers and specialists study how to protect state's redwood trees from soil compaction and other damage from recreation, logging and development

1964

50th anniversary of Smith-Lever Act; UC Extension has 532 farm and home advisors and specialists in 50 subject areas



1965

Extension irrigation specialist and Sacramento County farm advisor encourage nurseries to use plastic tubes with electric timer to irrigate containers, rather than overhead sprinklers

1967

Extension farm advisors work with UCD's Department of Vegetable Crops to develop new varieties of peppers resistant to tobacco mosaic virus



1970

Extension programs begin to take an international perspective, reflecting concerns about world food supply

Programs established in community development, farm personnel management, integrated pest management (IPM) and marine fisheries

1971

Extension farm advisors, specialists and Agriculture Experiment Station faculty boost Central Coast production by conducting mechanical harvesting trials for Ventura County citrus, demonstrating chemical inhibition of avocado top regrowth and assessing lettuce response to soil fumigation for nematode control

1960



1961

UC's pioneering biocontrol efforts well under way; scientists release imported parasitic wasps to combat specific citrus pests

1963

Farm advisors work with rice growers in Butte, Colusa, Glenn, San Joaquin, Sacramento, Sutter, Yolo and Yuba counties on fertilizer efficiency

1966

Extension entomologists and Fresno County farm advisors study impact of insecticides on beneficial insects in cotton fields, part of UC's work on pest control methods that utilize beneficial insects, mites and spiders



1970

1969

Expanded Food and Nutrition Education Program (EFNEP) developed to reach low-income families

1972

UC conducts drip irrigation experiments on San Diego County avocados

1973

In response to environmental concerns, UC works with Santa Clara County's canning industry on using cannery wastes as soil amendment

May 8, 2014: Day of citizen science

The real strength of UC Cooperative Extension is its ability to facilitate and build networks of knowledge that include scientists, producers, community members and practitioners. We learn together. This engaging process by everyone, not just the professional experts, has been an important part of our national history. Before the formalization of higher education and the specialization of scientific disciplines, much of our scientific knowledge was gathered by citizens through trial and error and then passed along to others. Presidents George Washington and Thomas Jefferson shared their knowledge of agricultural science in their correspondence and at agricultural fairs and meetings. Benjamin Franklin published scientific discoveries that provided a foundation for future technological innovation. John Bartram, a self-trained botanist and explorer, presented his plant knowledge in Philadelphia by making a garden, considered by many to be the nation's first significant botanical collection.

Citizen science is gaining traction in contemporary communities. Also known as crowd science, crowd-sourced science, networked science or public participation in science research, citizen science is a form of participatory scientific research conducted, in whole or in part, by amateur or nonprofessional scientists. Through citizen science projects, community members engage and participate in

scientific research by contributing their own knowledge, observations and intellectual efforts, often using social, web-based technologies or mobile applications.

On Thursday, May 8, 2014, the Division of Agriculture and Natural Resources (UC ANR) will celebrate the 100th birthday of UC Cooperative Extension with a citizen science event – the Day of Science and Service. UC Cooperative Extension will crowd-source data for citizen science projects about water, food and pollinators. Every Californian is invited to participate in this free celebration of science.

UC ANR is developing data collection maps, and participants will be able to access them through their computers or smartphones and add their data directly to the maps. After adding data, they will be

taken to a landing page with more information about why the questions are important and links to additional research in these three areas. After the Day of Science and Service, the data will be tabulated and analyzed, and the results will be shared with participants.

For more information about participating, visit <http://Beascientist.ucanr.edu>.

—Marissa Palin Stein



1976

UC research indicates that EFNEP improves dietary practices of low-income populations

1977

UC Small Farm Program established to focus on specialized needs of small-scale and limited-resource growers

1980

From 600 pages of oral history gathered by UC researchers, UCCE studies how technology has changed farms and farm families



1980

UC announces the release of six new strawberry varieties

1982

Peripheral Canal referendum fails; UCCE praised for providing objective water policy information to public

1986

UC begins two environmentally oriented programs: Sustainable Agriculture Research and Education Program, to help California growers practice sustainable production and marketing systems; and Integrated Hardwood Range Management Program, to study problems facing oak trees and other hardwoods

1980

1974

UC changes name of Agriculture Extension Service to UC Cooperative Extension (UCCE) to reflect its broadening social and economic purview



UC explores impacts of significant air pollution on Southern California leafy vegetables and on San Joaquin Valley cotton production

1979

UC Statewide Integrated Pest Management Program formed to accelerate research and education on production alternatives that use fewer chemicals

1981

UC survey of agricultural college graduates shows women have not yet broken barriers in employment, salaries and status in agriculture
UC hires its first affirmative action officer to encourage more women and minorities to seek careers in CE



UC Cooperative Extension history

seemed to ensure. The experiment station at Riverside served as the foundation for the UC Riverside campus.

By the time the Smith-Lever Act became law, new knowledge and technologies developed by UC scientists were critical to the growth of farming and allied industries around the state. UC agriculture faculty were already offering short courses at farmers institutes, but farmers were clamoring for more and eager to have a Cooperative Extension educator, known as a farm advisor, assigned to their community.

Anticipating passage of Smith-Lever, UC officials required each county government that wanted to participate in a Cooperative Extension partnership to allocate funding to help support Extension work in that community. Additionally, it was required that a group of farmers in participating counties organize into a Farm Bureau to help guide the Cooperative Extension farm advisor on the issues of local agriculture. (These grassroots groups later evolved into the California Farm Bureau Federation.) The first California county to sign up, Humboldt County, had its farm advisor in place by July 1913, before passage of the federal legislation. Seven more counties came on board in 1914, and in the following years 41 of the 58 California counties secured Cooperative Extension farm advisors.

Cooperative Extension played a critical role on California's home front during World War I, helping farmers to grow enough wheat and other crops to meet expanded wartime needs. Extension's value was quickly established as farmers came to rely on having an expert close at hand who was familiar with local conditions and crops. In addition to addressing the needs of farmers, Cooperative Extension soon expanded to provide educational opportunities for their families. Female extension agents — home advisors — were hired; they taught food preservation and nutrition and ran other programs for rural women and activities for local youth. This new generation of college-educated female home economists increased the contact and interchange between urban and rural communities, especially on social and domestic issues. Cooperative Extension also reached thousands of young people who would learn about food production, animal husbandry, cooking, science and more through participation in 4-H clubs.

UC Cooperative Extension today

UC Cooperative Extension, part of UC Division of Agriculture and Natural Resources (UC ANR), is comprised today of 320 locally based Cooperative Extension advisors, 650 campus-based Cooperative Extension specialists, 60 county offices throughout the state, and nine research and extension centers. It has

1988

UCCE reorganized, making campus-based specialists integral part of academic departments



1989

California 4-H club members number about 76,000; more than 40% live in large cities or suburbs and 55% are girls

1992

Experts from UCCE analyze economic impact of sweet potato whitefly in Imperial Valley



1993

UCCE helps small-scale growers by providing workshops for Southeast Asian immigrant growers in Central Valley

1996

UCCE begins using World Wide Web and email to conduct outreach

Spanish-language UCCE specialist begins using radio to teach nutrition to Latino families



2001

UC scientists develop integrated approach to managing sudden oak death, a disease that has killed millions of oak trees

1999

UCCE team documents significant benefits from agritourism to growers and communities in San Diego and other metropolitan counties

1990

1990
Money Talks program developed by UCCE home economists to help low-income families improve their financial situations

1991

UCCE specialists share potential impacts of fair trade agreements on popular commodities

1994

Study by UCCE scientists documents trend of growers using more sustainable farming practices



1995

With help from UCCE researchers, almond growers in Merced County reduce pesticide use

2000

2000
Study by UCCE researchers finds that school gardens teach children healthier eating habits



1998

In response to dust pollution concerns, UCCE scientists collaborate to stabilize soil and reduce windblown dust in Antelope Valley

rural roots, but as the nation has grown and communities have changed, Cooperative Extension has evolved, adapting programs and developing new ones to meet the needs of rural and nonrural audiences. Since the 1960s, the Expanded Food and Nutrition Education Program (EFNEP) has provided free nutrition education classes in urban communities. Thousands of urban and suburban residents have benefited from the Master Gardener program, which offers workshops and advice to home, community and school gardeners; currently, more than 5,400 master gardener volunteers serve California communities. The Master Food Preserver program teaches Californians to safely preserve the healthy foods we produce. A new Master Naturalist program is training volunteers to help communities respond to complex issues in sustainable natural ecosystems; observations by volunteers in the community are recorded using mobile technologies so the data can be studied by scientists, who then respond to and help solve community problems.

All of Cooperative Extension's activities are grounded in university research and developed in partnership with local communities. After a century of service, UC Cooperative Extension continues to deliver practical, trusted, science-based solutions to Californians.

Suggested reading

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2005

Kearney Agricultural Research and Extension Center celebrates 40 years partnering with UCCE on research

2007

UCCE develops and tests IPM program for cut roses, the largest component of California's cut-flower industry



2013

UC ANR holds Global Food Systems Forum, attracting viewers from more than 70 countries

2014

UCCE celebrates 100 years of bringing science and service to California communities

2003

To help California cheesemakers develop successful marketing strategies, UCCE studies shopping habits of specialty cheese consumers

2010

Four UC ANR strategic initiatives established: Sustainable Food Systems, Healthy Families and Communities, Endemic and Invasive Pests and Diseases and Sustainable Natural Ecosystems

UCCE study finds Southern California nurseries adopting best practices for reducing water runoff from their facilities

2011

Strategic initiative for Water Quality, Quantity and Security established

Collaborative UCCE and UCD study on nitrate levels in groundwater released to State Water Board and governor

2010

2004

UCCE nutritional research finds link between food insecurity and obesity in Latino families



2006

UCCE study finds decreasing size of grape harvest baskets leads to healthier farm workers and fewer back problems

2008

Sonoma and Napa UCCE study biocontrol in vineyards as part of CE's work on making viticulture more sustainable

2009

UC ANR introduces its Strategic Vision through 2025

2012

UC ANR internal grants program funds research and extension education in new areas of biofuels and local food systems

—Rose Hayden-Smith, Rachel Surls and Marissa Palin Stein

Developing Northern California's first ranch marketing program

California's El Dorado County was once part of a thriving commercial pear-growing region. In 1958, its growers produced more than 52,000 tons of pears on 3,400 acres. The local Placerville Fruit Growers Association, established in 1915, was a busy pear-packing cooperative. But in the late 1950s, pear decline disease invaded California and nearly destroyed nearly all of El Dorado's premium Bartlett pear orchards. By 1964, the county's production had dropped to 8,435 tons. Farmers were devastated, and their families at risk.

The late Dick Bethell was UC Cooperative Extension pomology advisor in El Dorado, San Luis Obispo, Santa Cruz and Sonoma counties but he lived in Placerville. He couldn't stand watching his community suffer, and he got to work restructuring El Dorado's entire growing industry. Bethell encouraged local growers to diversify into stone fruits, wine grapes, berries and, most of all, apples.

In the 1960s, after a visit to Oak Glen, a successful apple-growing region in Southern California's San Bernardino Mountains, Bethell and his partners envisioned a similar agritourism industry in El Dorado County, based on apple production. Bethell, grower Gene Bolster, agricultural commissioner Ed Delfino, and retired army officer

Bob Tuck formed the Apple Hill Growers Association, based on the Oak Glen model and its agritourism by-laws. The following summer, in 1964, they held their first Apple Hill picnic for the news media, and not long afterwards they recruited visitors at the California State Fair.

Today, the Apple Hill Growers Association has grown from 16 farmer members to over 55, and Apple Hill has the largest concentration of apple growers in all of California. Their efforts have paid off: Apple Hill has become a very popular tourist destination in Northern California. More than 750,000 visitors tour the area each year to visit you-pick farms; buy fresh apples and apple products; chop Christmas trees; eat lunch; and stop at a local brewery, spa and wineries.



Apple Hill has the largest concentration of apple growers in all of California. Above, Boa Vista Orchard in Placerville.



More than 750,000 visitors tour the Apple Hill area each year to buy fresh apples and apple products.

Apples aren't the only crop El Dorado visitors now enjoy, and UCCE's Bethell had a hand in that as well. Once a thriving wine country, with early settlers supplying Gold Rush communities with spirits and fruit, El Dorado's wine grape industry suffered during Prohibition and from grape phylloxera.

In 1965, Bethell oversaw the planting of several wine grape test plots at various foothill elevations in the county. The wines produced from these plots were evaluated by the UC Davis Department of Enology, which confirmed the suitability of the region for quality wine grapes. The re-emerging industry grew from 6 acres to more than 2,000 acres of vines and 50 wineries during Bethell's tenure. The county was officially designated as an American Viticultural Area in 1983, and today, thanks to the early encouragement by Dick Bethell, El Dorado produces some of California's top wines and most beloved apples.

— Marissa Palin Stein



Since the planting of wine grape test plots in 1965, the wine industry in El Dorado County has grown to more than 50 wineries and produces some of California's top wines. Above, Boeger Winery vineyard in Placerville.

UCCE's connection to the community continues

Introduction

UC Division of Agriculture and Natural Resources (ANR) research — on campuses, at research and extension centers and in Cooperative Extension offices throughout the state — focuses on critical issues in California's agriculture, natural resources, youth development and nutrition. Five strategic initiatives in UC ANR provide collaborative opportunities for addressing these issues: Endemic and Invasive Pests and Diseases; Healthy Families and Communities; Sustainable Food Systems; Sustainable Natural Ecosystems; and Water Quality, Quantity and Security. These initiatives look for new approaches, new resources and new partnerships within and outside UC to identify, communicate and solve these problems. The five Cooperative Extension projects highlighted in this article represent these five strategic initiatives.

Today, in its 100th year of service, UC Cooperative Extension (UCCE) is as connected to California communities as ever. UCCE advisors provide expertise and practical, science-based solutions on a wide range of subjects — from family health to food production to water quality to invasive pests — and have a keen understanding of local issues because they live and work in the communities they serve. The following are just a few examples of the many ways UCCE benefits Californians now.

SUSTAINABLE FOOD SYSTEMS STRATEGIC INITIATIVE

Beginning growers and ranchers

Farming as a way of life is waning in Sonoma County, as agricultural land is converted to housing and the average age of growers nears 60 years. "We need to bring new farmers into the business," says Stephanie Larson, director of UCCE Sonoma County.

To do just that, she launched a Beginning Farmer and Rancher program with a 3-year grant from the United States Department of Agriculture (USDA) beginning in 2011. The program includes hands-on experience in production and business planning (including marketing, organic certification, permitting and regulations, and lending) as well as mentoring by local master growers and ranchers. "Farming is challenging," Larson says. "People can have a great idea but often fail due to the business end."

Just as importantly, participants get access to land. They can lease vacant county land, and can use a website that matches new growers and ranchers with private landowners who want to lease acreage. In addition, a training farm — known as an incubator farm — is in the works, which will help participants get started by, for example, providing shared equipment, mentoring, and a lower initial lease rate.

"We have folks who already have land and are hoping to reinvent and save their family farms, or who are switching careers to grow local food," says Linda Peterson, UCCE Beginning Farmer and Rancher program coordinator. About half of the 43 participants to date are minorities, women or low-income, and most are now working in the agricultural field. "They've increased production, started farms or are working on farms," she says. Their operations include local hard cider, dry-farmed tomatoes, sheep and goat cheese, and agricultural tourism.

Now, Larson and Peterson are integrating their Beginning Farmer and Rancher program into the sustainable agriculture program at Santa Rosa Junior College, which will ensure that the program continues long after the USDA grant is finished.

HEALTHY FAMILIES AND COMMUNITIES STRATEGIC INITIATIVE

Eating Smart, Being Active

Most of us know the basics of a healthy lifestyle — eat plenty of fruits and vegetables, exercise regularly, and so on — but knowing what to do to and



Beginning Farmer and Rancher (BFR) participant Kelly Osman tags the ear of a pregnant Black Angus cow, with help from Denner Ranch owner and BFR mentor Terry Lindley (front) and ranch hand Joey Howard (back).

actually doing it are far from the same thing. To help Californians make healthy choices that stick, UC ANR administers and UCCE delivers the federally funded Expanded Food and Nutrition Education Program (EFNEP) statewide.

As part of the program, UCCE nutrition educators teach adult classes with the *Eating Smart, Being Active* curriculum, which was developed by EFNEP and UCCE staff at UC Davis and Colorado State University. Used by Cooperative Extension nationwide, the curriculum consists of eight 1-hour classes that help people make healthy lifestyle choices. Sessions include “Get Moving!,” “Vary Your Veggies, Focus on Fruit,” and “Make Half Your Grains Whole.”

In 2013, this program reached more than 9,000 low-income families in California. “Half of participants now eat three or more servings of vegetables and two or more servings of fruit per day,” says Connie Schneider, director of UC ANR’s Youth, Families and Communities statewide program, which includes EFNEP. “This is a remarkable improvement.”

Juana Gonzalez of Colusa is a standout EFNEP graduate. She went from eating hardly any produce to enjoying two cups each of vegetables and fruit a day, and now seasons her food with herbs and spices instead of salt, and drinks water instead of soda. She also bumped up her daily exercise from less than half an hour to more than an hour. Her reward? Gonzalez has lost weight and no longer needs high blood pressure medication. “I feel better and, best of all, my teenage daughter is making healthy lifestyle changes with me,” she says.

Besides embracing her new lifestyle, Gonzalez inspires others to do the same. “Now Juana comes to the first class of my other sessions to say, ‘Look what this did for me,’” says Sonia Rodriguez, EFNEP nutrition educator at the Altamir Learning Center in Colusa. “She’s a great advocate.”

SUSTAINABLE NATURAL ECOSYSTEMS STRATEGIC INITIATIVE

Training conservation volunteers

Just an hour’s drive north of Los Angeles, the Tejon Ranch Conservancy was overwhelmed with requests to visit the 240,000 acres of oak woodland, desert, fir forest and chaparral that it manages. This range of habitats makes the ranch a hotspot of biological diversity, with big draws such as condors, pronghorn, mountain lions and stunning wildflower displays. “This is a huge piece of land that is really unique in California because there has been no intensive recreation — ranching can be more compatible with endangered species than a lot of people tromping around,” says Sabrina Drill, UCCE natural resources advisor in Los Angeles County. “Because this is still working land, all public access needs to be guided, and they couldn’t keep up with the demand.”

Drill is also co-director of UC ANR’s new California Naturalist Program, which partners with local organizations statewide to engage the public in the study and stewardship of California’s natural resources. This makes the program a perfect fit with the Tejon Ranch Conservancy. “They need help with monitoring and restoration projects, and with allowing the larger community to come and enjoy the land,” she says. “They thought they were going to have to develop their own



Tejon Ranch Conservancy volunteer Deonsa Taylor measures residual dry matter on rangeland, which will help manage grazing on this working cattle ranch.

curriculum so they were excited to have a UC-vetted, science-based stewardship education program already available.”

The curriculum includes 40 hours of class time and field training, as well as individual capstone service projects. The first Tejon Ranch class was held in the fall of 2013, and many of the projects — which included acorn monitoring, pronghorn surveys, a weather station and a camera network to monitor wildlife — are ongoing. Training will continue yearly, and graduates will also guide wildflower and natural history tours, and, ultimately, staff the ranch’s nature center.

“We have 20 graduates who are already providing valuable citizen science work,” says Scot Pipkin, public access coordinator of the Tejon Ranch Conservancy. “This program provides an excellent foundation for our volunteers.”

WATER QUALITY, QUANTITY AND SECURITY STRATEGIC INITIATIVE

Balancing grazing and watersheds

Today’s harmony between grazing and public lands in the Bay Area stems from UCCE work that began in the 1990s. Back

then, it looked like the region's grazing would soon be a thing of the past. "There were concerns that cattle were a vector for pathogens in drinking water," says Sheila Barry, UCCE livestock and natural resources advisor for the San Francisco Bay Area. "The San Francisco Public Utilities Commission (SFPUC) wanted to get rid of grazing on 40,000 acres in the East Bay."

Ranchers, some of whom had worked this land for three generations, asked Barry for help. "We had just 60 days," Barry says. Coincidentally, UCCE had just finished a statewide survey on cattle and *Cryptosporidium*, a fecal pathogen. "This was the key," she says. "We had the data to help answer the SFPUC's questions about grazing and drinking water safety."

The survey showed that *Cryptosporidium* shedding was most common in calves younger than 4 months, helping Barry and her collaborators develop a grazing plan for the SFPUC land. For example, calving has to be done by the beginning of November. "This way the young cattle are old enough not to shed by the time it rains enough for runoff to load water with pathogens," she says.

Another facet of the grazing plan is keeping cattle away from waterways. "We sat with the ranchers and went over their riparian areas and streams, and fine-tuned cattle's access to these waters," Barry says. Ongoing monitoring ensures that ranchers maintain the fences that keep herds where they should be.

Buy-in was also critical to the plan's success. "We included all stakeholders from the beginning, taking them on rangeland tours and explaining the management," Barry says. Based on the UCCE plan, in 1999 the SFPUC adopted best management practices (BMPs) for grazing watersheds. Besides preserving the livelihoods of the ranchers who came to Barry for help, the BMPs set the stage for continued grazing on public lands throughout the Bay Area.

ENDEMIC AND INVASIVE PESTS AND DISEASES STRATEGIC INITIATIVE

Preparing for Africanized bees

Another UCCE project in the 1990s has had lasting benefits for the alfalfa seed industry. California is among the nation's top producers of alfalfa seed, with 38,000 acres in the Central and Imperial valleys that yield 11,000 tons of seed per year.

At the time, alfalfa seed growers were worried that the extremely defensive Africanized honey bee would soon reach the San Joaquin Valley. So they asked Shannon Mueller, UCCE farm advisor in Fresno County, to help them start using the alfalfa leafcutting bee. Unlike the European honey bee, the alfalfa leafcutting bee does not breed with Africanized bees and so cannot inherit their aggression.

While leafcutting bees were already widely used in Canada and the Pacific Northwest, no one knew how they would survive the hot temperatures and low humidity of California's interior valleys. Moreover, an alfalfa seed company had already tried to introduce them to California without success. "It was called a million dollar mistake," Mueller says.

But this time it worked. Why? "The growers and seed companies all sat down at the same table with UCCE as the conduit, sharing research-based information on what did and didn't work," Mueller says. "We learned how to manage the leafcutting bee for our conditions." This was essential because while honey bees are managed by beekeepers, leafcutting bees are managed by growers and seed companies.

Today, the combination of leafcutting bees and European honey bees is a standard in California's alfalfa seed industry. Besides giving growers an additional pollinator, the leafcutting bee increased yields by about 300 pounds an acre. This is partly because the bees pollinate alfalfa more efficiently and partly because they complement honey bees. For example, irrigation discourages honey bees but not the leafcutting bees.

"Growers have said that without the alfalfa leafcutting bee, they wouldn't be in the alfalfa seed business anymore," Mueller says. "This was a phenomenal project — it's a standout in all my years in Cooperative Extension."

—Robin Meadows



Peggy Greb, USDA ARS

Alfalfa leafcutting bee on an alfalfa flower

Chuck Deatherage of Seed Services, Inc. in Fresno checks the flight and nesting activity of alfalfa leafcutting bees, which nest in this trailer.



Shannon Mueller

Historical research

California Agriculture journal publishes peer-reviewed research and news for the University of California Division of Agriculture and Natural Resources. In the journal's January–June 2014 issue, the following three historical sidebars accompanied three contemporary research articles. The “Early grain storage research” sidebar was paired with the article “Survey of rice storage facilities identifies research and education needs.” “The Nutriture of People” accompanied “Seniors, and their food handlers and caregivers, need food safety and nutrition education.” And “Early conclusions on Pierce’s disease” sat alongside “Pierce’s disease costs California \$104 million per year.”

As part of our recognition of UC Cooperative Extension’s Centennial year, *California Agriculture* will continue to pair short historical sidebars with current research articles throughout 2014. The connections between article and sidebar will vary. Some historical sidebars may draw from the same broad research area, while others may discuss earlier studies of a problem still being investigated by contemporary scientists. Problems affecting the state’s resources, commodities and people evolve, and research that was genuinely new and enlightening at one time may now be taken for granted or even discounted. The variety of these connections of old and new help to place the university’s scientific endeavors into a larger context. And they remind us how today’s science builds on previous knowledge as UC researchers continue to work to improve the lives of Californians and the environment in which we all live.



A Celebration of Science and Service



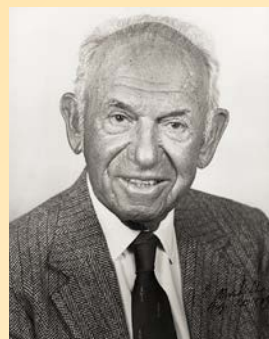
Dryness Protects Farm Stored Grain From Insect Attack

Early grain storage research

1947 “Many insects that infest grain in farm storage are small. Some are smaller than a grain of wheat. In fact, with some species, a single kernel of grain furnishes sufficient food for the development of from one to several individuals.

“Among the more important pests are the granary weevil, rice weevil, lesser grain borer, Angoumois grain moth, confused flour beetle and the saw-toothed grain beetle. The first four mentioned are capable of attacking and destroying sound grain. The others generally feed upon broken grains, particularly the finer particles.

“Where the environment is favorable, these insects cause serious damage and under extreme conditions the grain may be completely destroyed. Most of the important grain pests are widespread throughout California and if grain is not properly protected it is subject to heavy infestation.



“The development of stored grain pests is largely regulated by temperature and the moisture content of the food on which they feed. The most favorable temperature range is from 80 to 85 Deg. F; while the most ideal moisture content of the food ranges from 13 to 17 per cent.”

Dryness Protects Farm Stored Grain From Insect Attack

A. E. Michelbacher

Many insects that infest grain in farm storage are small. Some are smaller than a grain of wheat. In fact, with some species, a single kernel of grain furnishes sufficient food for the development of from one to several individuals.

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Development of Stored Grain Pests
The development of stored grain pests is largely regulated by temperature and the moisture content of the food on which they feed. The

(Continued on page 3)

At the time of this writing, author Abraham E. Michelbacher was assistant professor of entomology and assistant entomologist at the Agricultural Experiment Station at UC Berkeley. He went on to become a full professor and leader in UC Berkeley’s Department of Entomology, as well as a pioneer in the fields of biological pest control and the specifically targeted use of pesticides. After retirement in 1960, he was named professor emeritus and continued his research and Extension work for nearly 30 years more. Michelbacher died in 1991, aged 92.

The Nutriture of People

From *The Yearbook of Agriculture* (USDA 1959), "The Nutriture of People"

1959 "... Although more Americans over 60 own their own homes than do younger people, institutions for older persons also are increasing more rapidly than for any other age group.



"Institutional food service generally is planned to provide approximately the amounts of nutrients recommended for the largest group in the institution. Several studies between 1948 and 1956 of older groups in institutions have indicated however, that the daily meals, as served, may provide recommended amounts of nutrients, but the actual nutrient intake levels of the older individuals often are below the recommended amounts.

"This situation is not unlike comparisons of intake levels of families as a whole and of the individual members of families. Among the groups in large institutions, however, there is less consideration of individual food habits and food preferences in planning menus than there would be for family groups.

"Studies by the California, Florida, and Rhode Island Agricultural Experiment Stations between 1950 and 1956 indicated that the nutrient intake levels of older groups in institutions generally are substantially lower than the nutrient intake levels of older persons in individual homes. Most of the residents in public institutions consumed considerably less than recommended amounts of all nutrients. . . .

"When their intakes of iron and of protein were adequate, some relationship was evident between the intake of iron and protein and the hemoglobin. When intakes of iron and protein are generally high, hemoglobin levels may be rather consistent — an indication that hemoglobin beyond certain intake levels does not generally increase with higher intakes."

Agnes Fay Morgan, co-author of the essay excerpted above, was a pioneer among women in American science. Morgan came to UC Berkeley's faculty in 1915. The next year, she became a founding co-chair of the

Department of Home Economics. Two years later she was sole chair of the new Department of Household Science, within UC Berkeley's College of Agriculture. Her goal was to validate or debunk common household customs of cookery, clean living and good order by scientific means, and in that way promote sound practices in this tradition-bound arena. Those who studied under Morgan were well qualified to teach science and nutrition courses, along with the cooking and sewing classes one might expect of a home economics graduate.

Morgan's service to the University has been recognized in many ways, including a special symposium held on the 50th anniversary of her joining the faculty and the naming of Agnes Fay Morgan Hall, UC Berkeley's nutrition building, in her honor.



UC Professor Agnes Fay Morgan.

BACTERIUM

discovered to be cause of
PIERCE'S DISEASE OF GRAPEVINES

Early conclusions on Pierce's disease

1974 "The newly discovered Pierce's disease bacterium could destroy large numbers of grapevines and render parts of California unfit for the culture of common grape varieties.

"Since 1884, this disease has been periodically investigated with the belief that it was caused by a virus. . . . This study reports for the first time the isolation of a rod-shaped, gram-positive bacterium from the disease-spreading leafhopper *Draeculacephala minerva*.

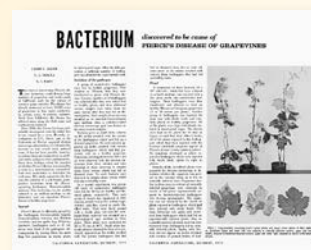
"A group of noninfective leafhoppers were fed on healthy grapevines, *Vitis vinifera* cv. Mission, then they were transferred to plants with Pierce's disease. Excreta (spittle) of 10 leafhoppers was collected after they were fed at first on healthy plants, and then additional excreta samples were taken from the same vectors after they had fed on diseased plants. Each sample of excreta was streaked on an enriched bacteriological agar medium.

"Bacteria grew as small white colonies on the media streaked with the excreta of the leafhoppers which had fed on a diseased grapevine. No such colonies appeared on media streaked with excreta from leafhoppers which had fed previously only on a healthy grapevine.

"These experiments have demonstrated that a gram-positive bacterium is the etiological agent of Pierce's disease in grapevines, and not a virus, as previously believed. The organism has been successfully cultured on artificial media. By using the leafhopper vector injected with the cultured and purified bacteria, the disease symptoms can be consistently reproduced in healthy grapevines and the same organism reisolated from clean leafhoppers fed on these plants and on naturally infected plants from the field."

All three authors contributed to the understanding and prevention of plant diseases throughout their university careers. Jaime G. Auger studied plant pathology at UC

Davis in the 1970s and went on to a professorship at the Departamento de Sanidad Vegetal, Universidad de Chile, Santiago. Thomas A. Shalla served as professor in the UC Davis Department of Plant Pathology. Besides his classroom work, he pioneered new electron microscopy techniques for the identification and study of viruses and infected plant cells, and led a task force to research and virtually eliminate pear decline, a serious disease in the state's pear industry in the 1960s. Clarence I. Kado is professor emeritus at the UC Davis Department of Plant Pathology. He was a university bacteriologist, both in the classroom and in the laboratory, and author of many scientific articles and a major college textbook on bacteriology.





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<http://ucanr.edu/sites/100years>

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