Desert Research and Extension Center

Originally named Meloland Field Station and later called the Imperial Valley Field Station, the Desert Research and Extension Center (DREC) was established in 1912 and has grown from 10 to 255 acres. The Center was established through the cooperative efforts of the University of California, interested citizens, growers, and the Imperial County Board of Supervisors. The Center’s primary research areas are desert agriculture, field crops, alfalfa breeding, vegetable crops, livestock environmental and feedlot management, irrigation and drainage management, and pest management.

Crops of importance in the area and at the Center are alfalfa, wheat, barley, cotton, melons, broccoli, cauliflower, lettuce, onions, and sugar beets. In an area where annual rainfall is less than 3”, research stresses the development of optimal irrigation-fertilization strategies that take advantage of desert conditions. The Imperial Valley has an important cattle-feeding industry. Researchers use DREC facilities to study beef and sheep feeding practices under low-desert valley conditions, where summertime temperatures can reach 120°F.

Automation of Surface Irrigation Systems

California’s field crops are primarily watered using surface irrigation systems resulting in significant water losses.

- Every year, California’s Imperial Valley uses 2.5 million acre-feet of Colorado River water for irrigation.
- But, the Imperial Valley loses 17% of this irrigation water to runoff and deep percolation.

Research at the Center quantified potential water savings, and estimated the costs associated with implementing automated surface irrigation systems as well as identified the labor irrigation savings associated with such systems. The Center has set-up the system on-site for calibration and testing, and the area also serves as a demonstration and educational site for growers. Educational opportunities include technical training and water conservation education for growers and irrigators on water management practices to improve water use efficiency. The automation system will be installed in four commercial field crop farms in California.

Preliminary results indicate that automated surface water irrigation systems:

- reduce agricultural water loss by more than 7%.
- that’s more than 57 billion gallons of water saved.

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Farm Smart Program

Farm Smart is an educational outreach program of the Desert Research and Extension Center in Holtville, CA. It began in 2001 and continues to grow and educate visitors of all ages through the Winter Visitor and K-12 programs.

The Winter Visitor Program welcomes the local community, as well as current and retired farmers from all over the United States and Canada. Visitors learn how to make a recipe using produce grown locally. They also have the opportunity to tour the Center, learn about current and past UC research, and harvest vegetables including kale, broccoli, lettuce, beets, turnips, swiss chard, and more.

The Farm Smart K-12 Program runs more than 150 daylong agricultural education experiences each year. Students take part in hands-on activities such as harvesting and eating winter crops, and milking artificial cows and making butter. Students also learn about natural and renewable natural resources, bees and pollination, health and nutrition, and other farm topics.

To date, Farm Smart has reached more than 110,000 people.

Alfalfa Variety Development and Testing

Research at DREC has resulted in some of the most successful alfalfa varieties ever developed. One pest resistant variety, CUF 101, was made publicly available in 1977, and is still widely grown throughout the world. Varieties are continually developed for resistance to new pests and increased seed production. Results of variety testing at DREC and other UC locations are reported annually, providing growers with information about local varietal yield differences in the alfalfa growing regions of California. Selecting location specific high-yielding varieties enables growers to earn the most profit from their fields.

Variety testing information is potentially worth $319 million dollars to California growers each year. Since 1949, 11 new alfalfa varieties, resistant to new pests, have been released to the public.

Over the past five years, the value of California’s alfalfa crop has increased by more than 67%.

California produces 1/3 of the US alfalfa seed each year.

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Hansen Agricultural Research and Extension Center

UC Hansen Agricultural Research and Extension Center (HAREC) is the newest of the nine Research and Extension Centers System (RECS) facilities, and began its existence with the Thelma Hansen estate. Miss Hansen, a UC Berkeley graduate, took over business operations of the Hansen family farm in the 1920s. Thelma appreciated the importance of agriculture and became an advocate for the conservation of natural resources, which led her to endow a generous portion of her estate to the University of California. The Thelma Hansen Fund was created in 1993, and in 1997, Hansen Funds were used by the University to purchase the 27-acre farm known as the Faulkner Farm in 1997. The Fund and Farm were managed under the auspices of UC Cooperative Extension until transferred to the RECS in 2008.

HAREC provides land, labor, equipment, and facilities to researchers for small to medium-sized plot projects that are relevant to Ventura County agricultural issues. Projects include water quality, availability, management and conservation, pesticide alternatives, new promising crops, and biological controls for weeds and pests.

Primocane Blackberry Production & Management

California blackberry growers are the leading producers of fresh market blackberries in the US.

Field trials at HAREC and other coastal California locations evaluated the effect of management practices, such as mow down, pruning, and tipping, on the yield and harvest timing of new publicly available primocane blackberry varieties. PrimeArk blackberries produce fruit in the first year of growth. Findings indicate that delayed mowing, earlier pruning, and tipping to delay production result in highest yields during most lucrative market windows, but with cultural management production can be manipulated to match consumer demand from June until December. This new management information has been shared with growers of different scale – both organic and conventional. Field trials continue with emphasis on pest management, and results will be shared with growers.

Recommended blackberry management practices may result in:

- up to 30% higher yields
- a flexible harvest season, leading to higher production value for growers
- The PrimeArk variety is publicly available, and can be managed by growers of all sizes.
Strawberry Production

Strawberry is the leading crop for gross value in agriculture in Ventura County, and accounts for almost one third of the production in California. Research at HAREC has recently focused on irrigation and nitrogen management, and pest management for strawberry crops.

Environmental regulations limit the amount of nitrogen that can pass into ground and drinking water. One recent study is collecting data on strawberry water use and nitrogen uptake patterns. These data will inform growers on the most efficient times for watering and fertilizer application, maximizing the amount of nitrogen that is used by the plants, and reducing the amount of nitrogen lost to ground and surface water.

Another recent study at HAREC is assessing the roles that certain fungi play in strawberry crop health and crop protection. Researchers are collecting data on plant growth, health, and yield, using three different types of fungi that have previously been used for pest management.

4-H Youth Development

Education outreach is an important part of the HAREC mission. 4-H farm field trips, classroom outreach, the student farm, and Sustainable You! summer camp targets Kindergarten through 8th grade students, and focuses on agricultural literacy, plant science, nutrition, sustainability concepts, and local food systems. Visiting a working farm allows children, and their parents, to observe food growing and connect with the land, while classroom outreach brings some of the farm into the classroom. These youth programs, delivered by specially trained staff and volunteers, have a presence in 65% of the Ventura County School districts.

For the 2014-2015 school year, Hansen REC reached:

more than 4,900 youth
more than 800 adults
almost 50% of participating schools are Title I
In 1951, the University purchased the 4,630-acre Roy L. Pratt Ranch in Hopland, California to use as a site for long-term, controlled research on native rangelands, watersheds, and wildlife. Adjacent higher-elevation acreage was later acquired from the federal government. The Center now encompasses 5,358 acres. Historically, the Center’s educational mission has focused on animal science, rangeland management, wildlife, plant science, entomology, and public health. Other research has included plant response to grazing, fire, and other management strategies.

Four principal vegetation types (grass, woodland-grass, dense woodland, and chaparral) are found here, including more than 600 plant species. Most of the acreage is rangeland of rugged topography, situated in the foothills of the Mayacamas Mountains, part of the Coast Range. Only about 25 acres of valley floor are irrigated and suitable for cropland. The Center provides a rich, diversified opportunity for natural resources and agricultural research and extension programs, especially on topics pertinent to rangelands of the central and northern coast of California.

Tick-borne Disease Agents in the North Coast Region

Several tick-borne diseases afflict people in California, but little to nothing was known about most of their natural transmission cycles, risk factors for contracting them or how to prevent them as of 1974.

The Center for Disease Control estimates there may be as many as 30,000 new cases of Lyme disease in the US each year.

In 1974, a long-term, multi-disciplinary research program aimed at clarifying the ecology, epidemiology, and prevention of tick-borne diseases, especially Rocky Mountain spotted fever and Lyme disease, was initiated at the Hopland REC. Now in its 41st year, this research has revealed the primary tick carriers and/or wildlife hosts of those diseases and several others, human behaviors and environmental factors that increase one’s exposure to carrier ticks, and ways that people may minimize tick encounters. Information gleaned during these studies has been shared with the scientific and medical communities, the public, and the media via journal, magazine and outreach pieces, oral presentations, press releases, and radio and television interviews.
Lizard Malaria Host Parasite Ecology

Hopland Research and Extension Center hosts one of the longest running natural malaria studies, conducted by researchers at the University of Vermont, the Pennsylvania State University, and Norwich University. The malaria parasite, *Plasmodium mexicanum*, naturally infects the western fence lizard in northern California and has been under study at the center since 1978. Unlike most malaria species which use mosquitoes to get from host to host, *P. mexicanum* is transmitted to lizards by the bites of infected sand flies. This research is critical to our understanding of how natural malaria parasites cycle in the wild, and the drivers of the parasite-host dynamics. Previous research has focused on the effects of the parasite on the lizard host, parasite/host genetics, changes in parasite prevalence over time, and parasite growth patterns in infected hosts. Current research focuses on understanding the transmission biology of the parasite.

Annual Grassland Ecology

Managing towards target Residual Dry Matter (RDM) thresholds has long been a key tool for rangeland managers.

Grass and rangeland managers develop management practices that meet multiple goals: maximum forage quantity and quality, the conservation of native species, the enhancement of water quality, soil carbon storage, and the minimization of weeds and erosion. Long-term studies at Hopland have focused on developing an understanding of the ecosystem dynamics of local grass and rangelands, how the ecosystem is affected by invasive plants, and how changing vegetation mixtures affect grass and rangeland ecology and productivity.

Findings related to the importance of seedling densities in addition to RDM may further inform drought management strategies and support long term carbon sequestration in these critical ecosystems.
The Intermountain Research and Extension Center (IREC) was established in 1947 via a cooperative agreement between the US Bureau of Reclamation, the University of California, and the Tulelake Growers Association. The intent of this collaboration was to develop information relating to farm problems specific to the area, and practices that promote soil and moisture conservation on both public and private lands.

What began as a small, eleven acre demonstration farm has grown into a 140 acre center for innovative research, local and national meetings, and an educational resource for local communities. Current research is focused on irrigated field and vegetable crops; the development of new crop varieties; weed, insect and disease management; irrigation and water conservation; and plant fertility.

Educational opportunities include Annual Field Days, seminars, and hands-on workshops targeted at farmers, the agricultural industry, and school children.

Cultural Management of New Potato Varieties

The Intermountain region, with its high elevation, cool nights, and unique soil properties, is a prime location for growing potatoes. Community growers desire and value information about sustainable practices, new potato varieties, and adapting management practices from other potato growing regions.

For more than 50 years researchers at IREC have investigated ways to improve the yield and quality of new potato varieties. Experiments evaluated fertilization, seed spacing, storage, and pest management practices to maximize the benefits of new varieties and overcome shortcomings. Management recommendations have been developed for new colored varieties and bruise susceptible varieties, among others.

Since 1960, potato management research at IREC has resulted in:

- 60% increase in average potato yield
- Management recommendations for more than 100 varieties of potatoes
- 815% increase in revenue per acre
Community Outreach and Education

Researchers and Staff at IREC extend knowledge and information through our Annual Field Day, various grower meetings, tours, and local school-sponsored events. The Annual Field Day is an opportunity to share with the community the wide range of research conducted at the Center. The highlight of the day is a guided tour of Center research projects accompanied by UCCE advisor and UC researcher presentations covering topics like irrigation management, efficient fertilizer use, and new crop varieties.

Each summer, UCCE staff educate busloads of area children about the importance of agriculture in their daily lives. After walking and digging through potato and onion fields, the children receive planting seeds and mint cuttings, learning how to care for plants in their home gardens. School tours often end with a special treat of homemade mint-chip ice cream, made with mint oil distilled at the Center.

Alfalfa Harvest Management Strategies

Harvest management influences alfalfa yield and quality more than any other factor. As yield increases, harvest timing and the number of cuts per season directly affect grower returns and reputation. Quality decreases.

Studies at IREC have assessed how harvest timing affects alfalfa yield and quality, as well as field longevity and vigor in the intermountain region. Research results have guided the development of decision tools for growers, so they can determine the best harvest timing for their particular fields, including when to take the final harvest of the season. Alfalfa producers have determined the best strategy for maximizing yield, grower returns, and end-product quality. As a result, Tulelake Basin growers have become well known for producing high quality alfalfa suitable for dairies and export.

IREC’s alfalfa research has positively impacted the intermountain region:

- Alfalfa prices in the intermountain region have **doubled** over the past twenty years.
- Since the 1960s, Tulelake Basin high-quality alfalfa acreage has increased **200%**.

Harvest timing and the number of cuts per season directly affect grower returns and reputation.
Pistachios are a significant cash crop for California. US consumers depend on California pistachios to answer increasing demand.

Biocontrol of Aflatoxin Contamination

98% of US pistachios are grown in California

Over the past five years, California’s pistachio acreage has increased by more than 56%.

Pistachio crops are susceptible to certain fungal infections, some of which produce aflatoxins that can cause illnesses in humans and animals. Research at KARE has focused on reducing aflatoxins using biological control treatments. In the early 2000s, researchers identified and began testing a naturally occurring fungal strain AF36 of *Aspergillus flavus* that does not produce aflatoxins and displaces the fungi that produce aflatoxins. Approximately 200,000 acres of pistachios were treated with AF36 in 2014. Efforts are now focused on expanding the use of this fungal treatment to almonds and figs, which are also susceptible to aflatoxin contamination.

Use of the AF36 fungal treatment:

- reduces aflatoxin contamination by more than 50%
- which may add $5–10 million to California’s economy each year

Kearney Agricultural Research and Extension Center

In 1962, local farmers, business owners, and industry leaders raised funds to purchase the Mosesian Ranch for a UCANR research and extension center. The Kearney Foundation matched the funds to secure the land and begin construction on the Kearney Agricultural Research and Extension Center (KARE).

Kearney’s 330 acres of research facilities encompass a state-of-the-art greenhouse, 33 specialized laboratories, a postharvest laboratory, a mosquito control laboratory, multiple insectaries, and academic and administrative offices. Its controlled field studies occupy 260 acres of orchards, vineyards and fields.

KARE scientists have developed novel cultivation, pruning and planting methods for the valley’s major crops, while at the same time studying newer specialty crops like blueberries and Southeast Asian fruits and vegetables. Kearney has also been one of the key testing grounds for sustainable farming methods, such as integrated pest management (IPM), biological control, water conservation, nitrogen management, and the largest IR4 programs benefiting specialty crops in the Nation.
Community Outreach and Education

Kearney’s mission is to provide state-of-the-science research and educational programs to promote sustainability of California’s agriculture industry, and to enhance the quality of the rural environment. The Center is uniquely positioned to support the extension of UC’s research-based information to farmers and members of the public. General field tours are offered Monday through Thursday. Extension activities include meetings, field days, tours, web conferences, ANR publications, peer-reviewed journals, and an contemporary and emerging electronic tools such as online learning, web content systems and repositories, social media, impact and evaluation tools, along with specialized and public media outlets. Programs are offered and carried out in collaboration with county and campus-based UC academics as well as government, regulatory agencies, grower and commodity groups and private industries.

Specialty Small Fruit Development

Identifying new and specialty niche crops that can be produced profitably is essential to the economic viability of small farmers in California. Eighteen years ago, a small farms advisor asked the question “Why Not Blueberries?” This ongoing project has focused on blueberries, blackberries, and hoop house production of berries since then. Blueberries are especially well suited for smallscale farm operations. Beginning in 2001, trials run by researchers at KARE identified low-chill blueberry cultivars that are well adapted to the San Joaquin Valley, given certain amendments to soil and water and since then blueberry production in the Valley has blossomed.

- The market value of California’s blueberry crop has increased by more than 56% over the past eight years.
- Small farm blueberry acreage has more than doubled.
- US consumers are nearly TWICE as likely to buy blueberries as they were ten years ago.

99% of US consumers view blueberries as a healthy food.
Lindcove Research and Extension Center

San Joaquin Valley citrus growers and the University of California Riverside established the Lindcove Research and Extension Center (LREC) in 1959. The soils and climate at LREC are representative of the 200,000 acres of commercial citrus growing in the Central Valley of California. LREC orchards, greenhouses, laboratory and packline are used by scientists to conduct research projects at LREC that evaluate new varieties of citrus, better ways to grow citrus, and new ways to manage pests. Extension programs communicate the results to citrus clientele as well as the general public. Research is also conducted on avocado, olive, walnut and pomegranate.

A number of cutting edge research projects are being conducted in the laboratories and fields of Lindcove REC. The Center plays a major role in developing new citrus varieties and determining the best rootstock and scion (fruit producing) combinations for San Joaquin Valley conditions for citrus, avocado and walnut trees. As new insect pests enter the region, LREC orchards are used to test methods to respond to those pests yet protect natural enemies and honey bees. Molecular biology disease management tactics developed in campus laboratories are put to the test in real field situations at LREC.

Citrus production represents a significant contribution to both US supply and California’s economy.

For more than 50 years, the Citrus Clonal Protection Program (CCPP) has been responsible for the introduction in to California citrus varieties from other citrus-growing regions of the world. CCPP’s mission includes disease diagnosis, pathogen detection and elimination/therapy, and maintenance and distribution of pathogen-tested citrus propagative material (budwood) for the California citrus industry, citrus researchers, and the general public. With threats from serious citrus pests such as Huanglongbing on the rise, demand for disease-tested, clean budwood has significantly increased.

Over the past five years, the value of California’s citrus harvest has increased by almost 50%.

Over the last five years, the CCPP:

- Made 50 new citrus introductions available to farmers & researchers
- Sold more than 188,000 buds of 304 varieties, which may have produced more than 37 million trees
- Safeguarded the 261,000 acres of California citrus from diseases such as Huanglongbing and citrus leprosis

Citrus production represents a significant contribution to both US supply and California’s economy.
Community Outreach and Education

The extension programs at Lindcove REC communicate the results of the research to citrus clientele as well as the general public. Each year Lindcove hosts numerous meetings and field day events conducted by farm advisors and researchers to educate growers about the latest techniques in citriculture. Lindcove has a dedicated citrus demonstration orchard for grower and general public citrus training events.

Lindcove REC holds annual citrus training for Master Gardeners, teaching them about varieties, cultural practices, pruning methods, and about invasive pests and diseases. Master Gardeners take what they learn at LREC and train homeowners. It is estimated that 60% of Californians have citrus trees in their yards. With the deadly citrus disease huanglongbing expected to arrive in the near future in urban areas of California through a small insect called the Asian citrus psyllid, educating homeowners about how to watch for pests and diseases and how to avoid moving them around the state is critical.

Citrus Scion Breeding & Evaluation

Year-round demand for citrus, especially seedless varieties, has been on the rise. Helping California growers meet these demands drives research.

The goal of the citrus breeding and evaluation program is the development and release of new citrus varieties. This program has produced a number of tasty, low-seeded, easy peeling mandarins such as the ‘Tango’. At Lindcove REC, these new varieties are studied for a number of years to determine the best rootstocks to grow them on and to make sure they maintain fruit quality, tree health and yield as the trees age. This information is communicated to the growers and the general public.

Since it’s inception, the breeding and evaluation program has patented or licensed 10 new citrus varieties. Since its release in 2006, Tango seedless mandarin acreage has increased by more than 6,000 acres. The two most successful varieties have been sold more than 4.5 million trees.

Creating varieties that mature at different times of the year increase grower returns and meet consumer needs.
Sierra Foothill Research and Extension Center

The Sierra Foothill Research & Extension Center (SFREC) was formed following the acquisition of several large parcels in the 1960’s and has supported research, education and outreach in the Sierra foothills for well over half a century. The Center is located 60 miles northeast of Sacramento in Browns Valley, on the Yuba River. The site spans river, grassland, oak woodland and riparian habitats. SFREC provides land, labor, and infrastructure to support research on critical rangeland issues and provides key site resources to support education and outreach efforts. The Center supports programs and research focusing on beef cattle production, nutrition, and health, rangeland water quality management, oak woodland restoration, native plant conservation and invasive plant management, as well as monitoring and management of sensitive fish and wildlife species.

To support a broad range of field research and education activities, SFREC has more than 80 pastures, animal handling facilities and a feed barn, wet and dry labs, fabrication shops, conference rooms, and a dormitory and cook facility.

Cattle Abortion Vaccine

EBA is a cattle disease transmitted by a tick bite. It causes spontaneous abortion of calves, resulting in financial losses to California cattle producers.

Each year, EBA costs California cattle producers up to 6.3 million.

Research at SFREC has focused on identifying the cause of EBA, and developing and testing a vaccine, both for safety and efficacy. Initial vaccine trials began in 2011. Researchers followed groups of vaccinated and unvaccinated cows to determine conception and calving success rates in both groups. Researchers also examined vaccinated animals regularly for any evidence of vaccine reactions. Additional trials continue and, the vaccine may be approved and available for industry use as early as 2017.

In some California ranching regions up to 10% of calves are lost to spontaneous abortion caused by EBA.

Research trials indicate the vaccine is 95% effective. As many as 85,000 additional calves may be born each year.
Community Outreach and Education

One of SFREC’s major focus is fostering and supporting outreach and education programs, delivering them to those interested in a broader understanding of agricultural and natural resource issues in the Sierra Foothills. A series of nature trails and an education center on the Yuba River provide a compelling outdoor setting for both education and outreach opportunities.

Interpretive materials for the nature trails introduce students to a variety of topics, including water resources, native local vegetation, native American history, and wildlife habitat. Materials also include a plant identification guide.

SFREC’s Yuba River Education Center also provides a K-6 curriculum based on the Science Framework for California Public Schools, and developed by a credentialed grade school teacher from the Sutter County School District.

Rangeland Water Quality

Microbes, nutrients, and organic matter are often present in rangeland and pasture runoff water, posing a risk to California’s surface drinking water.

Nutrients such as nitrogen and phosphorus, may become carcinogenic when mixed with chlorine at water treatment plants.

Pathogens such as E. coli, Salmonella, and others are transmitted by wildlife and can also be found in runoff from cattle grazing areas.

Research at SFREC has examined microbial and carbon pollutant transport from annual grasslands, the role vegetative buffers play in filtering pollutants, and how effective residual dry matter management and buffers are at reducing pollutant transport. Research also examined the efficacy of small wetlands as filters for pollutants and sediments from irrigated pasture runoff. This research examines critical best management practices intended to safeguard drinking water quality in California’s foothill annual grassland and irrigated pasture systems.

Microbes, nutrients, and organic matter are often present in rangeland and pasture runoff water, posing a risk to California’s surface drinking water.

A few yards of vegetation can filter up to 99% of microbes from rangeland and pasture runoff.

Small, functioning wetlands filter up to 42% of nitrogen and phosphorus.
South Coast Research and Extension Center

South Coast Research and Extension Center was established by the University of California in 1956 and serves as a regional field laboratory for UC scientists to conduct agricultural and natural resource management research and extend research-based information to a wide spectrum of audiences. The Center is also home to UC Cooperative Extension Orange County and provides land, irrigation water, labor, equipment, and other facilities, and it serves as a repository for germplasm collections of many subtropical plants. Research efforts focus on fruits and vegetables including, but not limited to, avocados, citrus, stone fruits, strawberries, cherimoyas, persimmons, carrots, celery, sugarbeets, and tomatoes. The Center has earned a distinguished reputation, and the University now holds several U.S. patents for strawberry and avocado variety development. Considerable effort is also directed at agronomic crops, vertebrate pest management, turfgrass and landscape shrub/tree management, and ornamental plant nursery production in the greenhouse and in the field. The Center is also complemented by supporting work in entomology, plant pathology, biological control, and integrated pest management.

Water Conservation in Urban Landscapes

California’s water is a critical and limited resource. Water conservation and maintaining water quality are increasingly important issues, affecting all Californians.

Research at the South Coast REC evaluates water conservation and water quality practices for use in urban landscapes with the goal of protecting limited water resources. One study examines the affects of three different types of landscape plantings and irrigation technologies on water use, runoff rates, and pesticide volumes. Homeowners and landscape professionals are adopting recommended landscape management practices, such as drought tolerant plantings, advanced irrigation technology, and rainwater harvesting, to reduce water consumption and minimize pollutants carried in irrigation and stormwater runoff.

The use of smart irrigation technologies and native plants can reduce runoff by more than 60%.

Outreach activities extended best management practices to more than 1300 people in one year alone.
Community Outreach and Education

The South Coast REC provides a forum for extending the results of UC research to a wide variety of audiences. Extension of research to growers and other professionals is done through field days, workshops, seminars, and tours. Special events to educate the general public are offered throughout the year, and often include tram rides out to the field for talks and demonstrations.

Youth field days and events, often in partnership with local schools and non-profits, focus on water conservation, mulching, crops for large and small spaces, tours of South Coast REC extension and research projects, and basic pest management. Hands on activities include planting seasonal fruits and vegetables, as well as harvesting from previous youth field day plantings. Older students also learn about agricultural research techniques, careers in agriculture, and the importance of urban agriculture and water conservation in their daily lives.

Strawberry Breeding Program

California strawberries have broad market acceptance and environmental adaptation. Our growers lead the nation in strawberry production.

The UC strawberry breeding program is rooted in work initiated at South Coast REC in the 1950’s. As a result of the program, California strawberry growers hold a competitive advantage because their berries have excellent market acceptance and broad environmental adaptation. South Coast REC continues to host strawberry research trials focusing on the development of new strawberry cultivars with higher fruit quality and increased production efficiencies, better disease resistance, and improved cultural management systems. The ultimate goal of this program is to not only preserve the competitive advantage of California growers, but also provide sustainable alternatives where traditional production methods are no longer viable.

California strawberries have an annual farm value of more than $2.4 billion.

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- California strawberries have an annual farm value of more than $2.4 billion.
- More than 50% of supermarket strawberries trace their ancestry to the UC breeding program.
- More than 14 new cultivars released to California strawberry growers.

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The West Side Research and Extension Center (WSREC) was developed through the efforts of a group of farmers, business people, and University of California staff who believed that the highly-productive west side of the San Joaquin Valley needed a research field facility focusing on regional production issues of this part of California. The center was transferred to the University in May 1959, and its first research projects began in the spring of that year.

The location, facilities, and staff resources combine to provide a high crop yield potential site to evaluate a wide range of soil and crop management issues. Studies focus on evaluation of cultivars of currently-grown and new crops, emerging pest and disease issues and both biological and chemical control options, new practices and technology to improve efficiencies in water, salinity, and nutrient management, and field-testing of alternative reduced tillage practices with the potential to improve soil quality and resource use efficiencies. The low probability of any rainfall late Spring through Fall, and the semi-arid climate averaging less than 6” annual rainfall, make this an ideal location for studies related to irrigation water management and crop responses to drought conditions. Researchers can have nearly full control over the timing and amount of water available to crops during this period.

Since the 1990’s there have been major efforts in conservation tillage (CT) and reduced tillage research and demonstration trials at WSREC through the cooperative efforts of University of CA staff and collaborators who are members of the CASI team (Conservation Agriculture Systems Innovation Center). Their initial work included some of the first CT studies in the western US and continues today, with studies identifying which crops are best suited for conservation tillage practices in CA production conditions, how tillage practice changes affect energy use and soil quality, and how crop yields are impacted by a variety of reduced tillage practices. The program has been instrumental in introducing some of these alternative production management systems to California growers.

Conservation tillage practices may result in

- $80 or more per acre savings in fuel, equipment, and labor costs
- 40% reduction in the number of equipment passes
- More than 400% increase in CT acreages between 2004 and 2010
There are two large weighing lysimeters at the facility that are a part of long-term USDA-ARS/UC cooperative work on crop water use measurements. One of the first CIMIS (California Irrigation Management Information System) weather stations to be put into use is still located at the West Side REC, and this was a primary site for some of the field research that went into design and interpretation of this weather station network used for irrigation management decisions. The lysimeters, weather station, and evapotranspiration research at West Side REC, along with research conducted at several other sites, were used to identify improved designs for agricultural weather stations. These designs were used as prototype systems for the CIMIS network in use across California for improved evapotranspiration estimates and irrigation scheduling information.

Irrigated agriculture in the San Joaquin Valley has compounding problems of not enough irrigation water, saline groundwater as alternative water sources, and in some areas, shallow water tables, impacting crop yields and soil quality.

As of 2006, more than 100,000 acres had been retired due to salinity, lack of water, and inefficient irrigation practices.

Traditional irrigation may use 15-20% more water than drip irrigation.

Drip Irrigation Research

Some of the earliest subsurface and surface drip irrigation and fertilization research on annual crops in the US started at the West Side REC in the 1970s and continues to this day. As a result of this research, recommendations were developed for improved drip irrigation management to conserve water, approaches to better maintain drip systems, improve yields of multiple crops, improve fertilizer use efficiencies, and better define salinity management issues when using drip irrigation. Growers throughout California and much of the irrigated western U.S. have learned from these experiments and adopted many of the recommended drip irrigation and crop management practices.

Drip irrigation supports the efficient use of resources by allowing growers to be very precise with both water and fertilizer application, and can improve soil quality, promote beneficial microbial growth, and improve infiltration.

In arid, irrigated production areas, drip irrigation and targeted fertilizer applications have:

- increased tomato yields by 20% or more
- increased cotton yields by up to 15%

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