Impact and Opportunities:

College of Agricultural and Environmental Sciences

Helene Dillard, Dean

Seed Central / Food Central

November 13, 2014

The College

- No. 1 university in the world in agriculture and forestry
- 15 academic departments
- Centers and Institutes – many
- People
  - 360+ faculty / 800 staff
  - 6,635 undergraduate students
  - 1,000+ graduate students
- 5,000 acres on campus
  - 3,700 acres for ag. research and teaching
  - Classrooms / Laboratories
  - Greenhouses / Growth chambers
- Off-campus UC sites
  - UC Davis Research Stations
    - Bodega Marine Lab
    - Tahoe Environ. Center
    - etc.
  - UC ANR Research and Extension Centers (9 total)
    - Kearney Ag. Center
    - Hopland
- Off-campus research and outreach with industry, govt., and private partners

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Academic Departments

Agricultural Sciences

Animal science

Biological and agricultural engineering

Entomology and nematology

Plant pathology

Plant sciences

Viticulture and enology

Environmental Sciences

Environmental science and policy

Environmental toxicology

Land, air and water resources

Wildlife, fish and conservation biology

Human Sciences

Agricultural and resource economics

Food science and technology

Human ecology

Nutrition

Textiles and clothing

Centers and Institutes

(information and outreach links)

- Seed Biotechnology Center
- Agricultural Sustainability Institute
- Robert Mondavi Institute for Wine and Food Science (with olives and bees)
- Center for Produce Safety
- California Center for Urban Horticulture
- Center for Regional Change
- etc.

Cooperative Extension – UCOP ANR

- Outreach arm – translating research solutions for California
  - Agriculture
  - Environment
  - Communities and families
- Programs
  - Integrated pest mgmt.
  - Master gardeners, 4-H
  - etc.

Agricultural Experiment Station

- UC Davis faculty programs and projects collaborating with people and businesses across California

- Finding innovative solutions to solve critical issues
  - Food security and safety
  - Health and nutrition
  - Agricultural and environmental sustainability
  - Healthy families and communities

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International Programs

- Solving malnutrition
- Food security
- Developing agriculture in new areas of the world
- Building local economies
- Leads to regional and political stability
- Working in 17+ countries

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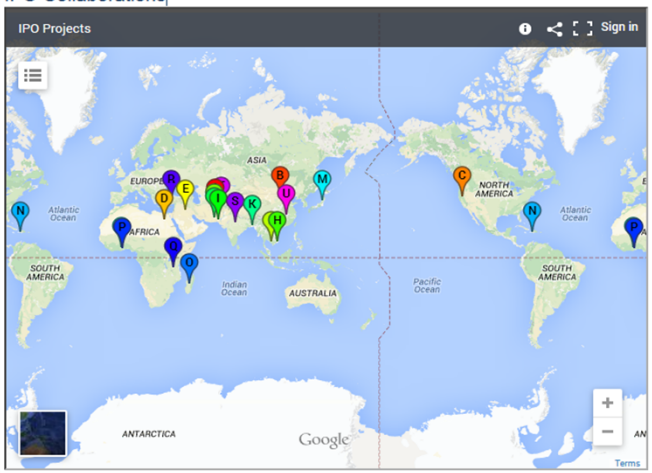
International Programs

IPO Collaborations



Cochran and Borlaug Fellows

Training and Workshops (on-site and in U.S.)

Central America
Costa Rica
El Salvador
Honduras

South America
Argentina
Brazil
Chile
Colombia
Ecuador
Peru
Uruguay
Venezuela

Caribbean
Grenada
Jamaica

Mideast
Egypt
Iraq
Lebanon
Oman
Syria

Europe
Moldova
Serbia
Turkey
Ukraine

Asia
Afghanistan
Bangladesh
Cambodia
China
India
Japan
Kazakhstan
Krygyzstan
Philippines
Pakistan
Sri Lanka
Tajikistan
Thailand
Turkmenistan
Uzbekistan
Vietnam

Africa
Angola
Kenya
Madagascar
Namibia
Senegal
Tunisia

Education

New STEM Report (Natl. STEM Food and Ag. Council, October 2014)

- Must feed a growing population – 9 billion people
- Goal for global food security
- The need for a human capital pipeline
  - With scientific, technological, and business leadership in food and agriculture
- Must develop opportunities for people to engage in food and agriculture careers
- Must drive private investment and public policy-making

Education

New STEM Report (Natl. STEM Food and Ag. Council, October 2014)

- Supply of qualified applicants is not sufficient to keep up with employer need for workers in Plant and Soil Science fields
- Employers are posting an average of 1,200 job ads and filling an average of more than 5,000 jobs each month
- Roughly 2,750 degrees are completed in a year in these fields
- The attraction – sustainability, global opportunities, technology and information based, rewarding

Education

UC Davis is committed to educational programs for students and industry professionals and leaders.

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Educational Programs

Traditional degrees

- B.S., M.S., Ph.D.
- Teaching credential
- 30 UG majors
- 45 graduate groups/programs

Student Internships

- Major specific requirement
- Engages industry, agency, public and private sector partners
- UC Davis Internship and Career Center (ICC)
- Seed Central's Student Program

Educational Programs

Courses for Professionals

Seed Biotech. Center

- Plant Breeding Academy
- Seed Business 101
- Seed Biology, Production, and Quality
- etc.

Postharvest Tech. Center

- Postharvest Technology Short Course
- Produce Safety Workshop
- Fresh-cut Products
- etc.

Educational Programs

Courses for Professionals

Ag. Sustainability Institute

- Annual Field Day, Russell Ranch
  - Themes: Technology, Soil, Nitrogen, Irrigation, Biodiversity
- etc.

Agribusiness Workshops

- For decision-makers in small or large enterprises
- Participate in discussions of strategic issues affecting the industry
- Interaction with peers through structured and informal dialogue.

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Research Impacts

UC Davis research in agriculture, the environment, and human/social sciences is top-ranked and has **impact** – in California, the U.S., and the world.

UC Davis Plant Breeding Program

- 100 years of developing many of the plant commodities grown in California – vegetables, fruits, nuts, grains, forages, ornamentals, turf.
- More than 150 varieties of crops released by UC Davis.

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University of California
UC Davis Plant Breeding

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Plant Breeding History
- Major Contributors
- UCD Varieties
  - Alfalfa Varieties Released
  - Almond Varieties Released
  - Asparagus Varieties Released
  - Barley Varieties Released
  - Bean Varieties Released
  - Celery Varieties Released
  - Cherry Varieties Released
  - Forage/Grasses Varieties Released
  - Grape Varieties Released
  - Olive Varieties Released
  - Peach Varieties Released
  - Pear Varieties Released
  - Pepper Varieties Released
  - Pistachio Varieties Released
  - Plum Varieties Released
  - Potato Varieties Released
  - Rootstock (stone fruit) Varieties Released
  - Strawberry Varieties Released
  - Tomato Varieties Released
  - Turfgrass Varieties Released
  - Walnut Varieties Released
  - Wheat Varieties Released

Useful Links

PRINT

UCD Varieties

UCD plant breeders have released many varieties into the public domain. Select a crop below to view the list of varieties.


Alfalfa


Almond


Asparagus


Barley


Bean


Celery


Cherry


Forage grasses


Grape


Olive


Peach


Pear


Peppers


Pistachio


Plum


Potato


Rootstock (stone fruit)


Strawberry


Tomato


Turfgrass


Walnut


Wheat

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UC Davis Wheat Breeding Program

- Wheat is one of the most important cereal crops worldwide
- Bred for adaptation to different climates, enhanced yield, pest resistance
- In the U.S., wheat is unique among major crops in that public sector research is the main provider of new varieties.
- UC Davis – Using Marker Assisted Selection to improve **public wheat breeding programs**
- 2014 international Wolf Prize in Agriculture – Jorge Dubcovsky

UC Davis Bean Breeding Program

- Phaseolus beans – important part of the human diet, especially in developing countries.
- Paul Gepts – leads the UC Davis bean breeding program – **new varieties** of lima bean, garbanzos, and common bean for the California grain legume industry.
- Participates in the African Bean Consortium – seeks to develop marker-assisted selection for East African bean breeding programs.

African Orphan Crop Consortium

- 100 African crop species – genomes being sequenced to **improve the nutrition** of African farm families, especially children.
- Partnership – UC Davis, Mars, Inc., and other global partners
- First orphan crop to be studied – baobab, which has antiviral properties and other health benefits

- 10X antioxidant level of oranges
- 2X the amount of calcium as spinach
- 3X the vitamin C of oranges
- 4X more potassium than bananas

Crop Improvement – Rootstocks

- Walnut rootstock breeding for different soil types, vigor, and **resistance/tolerance** to soilborne pests and diseases. *(Gale McGranahan, David Neale, Chuck Leslie and others)*
- Bioengineering (gene fusion) to develop citrus rootstocks that are **resistant** to citrus greening disease. *(Abhaya Dandekar)*
- Breeding for **salinity tolerance** in grape rootstocks. *(Andy Walker)*
- etc.

Nutrition: Low-income communities – Maternal and child nutrition

- Kay Dewey and Christine Stewart
- Malnutrition: Leading cause of death in young children throughout the world.
- Improved nutrition for mothers and children – a best investment to improve global health.
- Prevent malnutrition in developing countries with lipid-based nutrient supplements.
- Results have prompted **changes in global policies and guidelines for infant/child health.**

UC Davis: Research with *Impact*

- These were examples of countless research projects at UC Davis that advance the frontiers of science and improve food production, health, ag. productivity, environmental sustainability, and human well-being.

Food security and safety
Eliminating hunger
Healthful diets and nutrition
Agricultural sustainability
Environmental stewardship
Climate change
Clean energy, air, and water
Population growth
Healthy families and communities
Rural revitalization
Preventing global disease
Environmental biodiversity
Economic growth
International development

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Support

- State funding for the UC system has decreased, thus increased external funding is necessary to support critical research areas.
  - Research grants
  - Gifts
  - Philanthropic support
  - Industry partnerships
  - etc.

Must extend knowledge about the impact of the college's educational programs and applied research

Challenges for a Dean

- 400+ commodities, soil & water ecosystems, 38 million people
- Inevitable tensions at the agriculture / environment / human interface – yet the critical needs are in this space and exactly where our college should be!
- Differences in opinions and approaches
- Controversial appropriate research – climate change, water policy, drought, air quality, soil nitrates, poverty, etc.
- 6,635 undergraduate and 1,000+ graduate students
  - Increasing enrollments; decreasing space
- Infrastructure maintenance and renovation costs; increased high-tech laboratory needs for research
- Static state funding; need for increased philanthropy, grants and gifts from the private sector

The Vision

- To be the number 1 college in the world conducting cutting edge research in the agricultural, environmental and human sciences
- To be the first choice higher education institution in California for assistance in addressing critical research needs
- To enable our faculty to be world leaders in innovation and discovery – pushing the frontiers of knowledge
- To develop graduates who will continue the legacy of excellence

The Opportunities

- Identify areas of research that improve and sustain agriculture and food systems, the environment and natural resources, and human well-being
- Identify emerging fields and opportunities – within departments and cross cutting themes
- Develop multidisciplinary teams to conduct innovative research that advances the frontiers of discovery, and transformative research on critical issues in the intersections where agriculture, environment and humanity meet
- Replace retiring faculty and recruit outstanding candidates; retain our outstanding staff that support our research, teaching and extension efforts
- Translate research results and engage public and private partners in developing and implementing solutions to issues

The Opportunities & Strategies

- Prepare the next generation for rewarding careers
  - Research based data generation and collection
  - Teamwork, partnerships
  - International exposure – global context
  - Understanding and embracing the principles of diversity and inclusion
- Incorporate new technologies into instruction efforts
- Increase endowments, fundraising, philanthropy on behalf of the college, so that strategic investments can be made that will advance our research, teaching and extension/outreach efforts
- Strengthen existing relationships and build new public private partnerships and relationships

Thank you!

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