

# History of the University of California Department Agronomy and Range Science

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## **A Lasting Legacy**

The Division of Agronomy was one of the first divisions in the College of Agriculture established at UC Berkeley in 1868, and it was one of the first divisions to move to the farm at Davis, California. This early division evolved into an academic Department of Agronomy and later Department of Agronomy and Range Science at UC Davis. Over the years, the faculty number grew (Appendix A) and their research, teaching, and extension programs developed new knowledge through basic research. They applied this knowledge to the solution of agricultural production and natural resource management problems. From improving wheat production in the early 1900s to addressing production, sustainability and environmental impact challenges in the 21<sup>st</sup> century, the Department of Agronomy and Range Science (ARS) at UC Davis has left a lasting legacy of new knowledge that helped agriculture become one of California's leading industries.

The content of this history relied heavily on earlier publications including (Crocheron 1914, 1915, 1917, 1921a and 1921b; Miller 1968; Dickman 1972; Gepts 2001; Scheuring 2001, and George and Clawson 2014).

## **The Beginning**

Following passage of the Morrill Act in 1862, the University of California, located in Berkeley, was chartered in 1868 as California's land-grant university, with the College of Agriculture as its first department. In 1887 the UC Agricultural Experiment Station (AES), authorized by the Hatch Act, was established, and in 1914 the Smith-Lever Act established Agricultural Extension, now known as Cooperative Extension (CE), expanding the outreach mission of the college.

In 1901 the Animal Science Division was started at UC Berkeley, followed by the Agronomy Division in 1904. The Agronomy Division was initiated as a research department in the College of Agriculture's Experiment Station at Berkeley so that it could investigate wheat production which had been declining since 1889. Because this crop was a high-value commodity and a major export crop, the state legislature was concerned about the future of agriculture in California. In 1905 the state legislature

appropriated \$10,000 to investigate production and quality of wheat and to buy a “University Farm” to provide a place to teach scientific and practical agriculture and to provide a more representative site than Berkeley for agricultural research. In 1906 the University Farm was purchased at Davisville, California (the name was changed to Davis in 1907). By 1909, the Animal Science and Agronomy divisions had moved from Berkeley to Davis.

The University Farm opened for residential instruction in January 1909. There was technical instruction in agriculture and other subjects for high school-aged boys and there was a semester of courses for junior or senior men from UC Berkeley to supplement their academic education in the College of Agriculture. For years, regular university students in agriculture registered at UC Berkeley, took their first two years in the physical-biological sciences, and then transferred to Davis for one or two years of upper division work. By 1916, more than 90 students took a semester of instruction at the University Farm in Davis. By 1920, courses were available for degree students to complete their junior year at Davis and by 1922, lower division courses were available for students who wished to complete their first two years as well. It was soon possible for degree students to complete all requirements for graduation in several majors. Graduate study followed, initially in cooperation with the Berkeley faculty.

The first course listed as Agronomy was offered in 1909–1910 and Ben Madson (Figure 1), hired in 1910, was the first instructor. The first chairman of the Agronomy Division was George W. Shaw (1909–1913). Agronomy was taught as one of the subjects in a one-year course in general agriculture. Agronomy became a major for agricultural students in the College of Agriculture at Berkeley.

With the steady growth in enrollment came an increase in the number and qualifications of the Davis faculty. Under the second chairman, John W. Gilmore (1913–1924), the Division was expanded by bringing in George W. Hendry (1915), Patrick B. Kennedy (1917), W.S. Wilkinson (1919), William W. Mackie (1919), and John P. Conrad (1919), thus extending the interest of the Division to range plants, sorghum, corn, beans and the relationship of crop production to soil management.

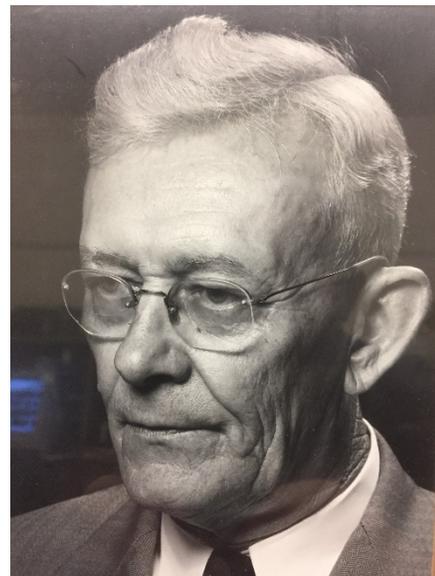


Figure 1. Ben Madson

During this time, G.W. Hendry was appointed to take charge of the Division of Agronomy at the University Farm in Davis. He developed a course in field crops which was required for graduation from the Farm School Program. The staff assembled by Gilmore represented agronomists of the time. Except for Kennedy, they had little advanced and specific training. They were fully capable of handling the subject matter of the courses they taught and of conducting research appropriate for the era.

In the early 1920s the Farm School was terminated. In 1922 the University Farm was renamed the Northern Branch of the College of Agriculture. Students had the option of taking their first two years at Berkeley or Davis and their last two years at Berkeley. During this period, there was an extensive reorganization and upgrading of the college's curriculum. Students majoring in plant and animal sciences could spend all four years at Davis but their degrees would be granted through Berkeley. Following WWII, the Agronomy Division became the Department of Agronomy.

Throughout the 1920s and 1930s the Davis campus steadily developed as a research institution and the Agronomy Division contributed significantly to the campus's growing reputation. During this period, Richard L. Adams served as acting chair of the Department of Agronomy from 1924 to 1927. In 1927, Ben A. Madson was appointed chair and served in that capacity until 1947, overseeing a great expansion in the department. Madson clearly recognized the need for a staff trained at the doctorate level in a basic science. Because of his effort, the courses and research in agronomy were subsequently based on sound scientific principles taught by faculty trained specifically in their area of responsibility.

By the 1930s the Agronomy Division and the U.S. Department of Agriculture (USDA) had established a close working relationship. V.H. Florell and Fred N. Briggs (Briggs was transferred to Agronomy in 1930) were part of the departmental research staff representing USDA. This close relationship still exists. Florell was replaced by G.A. Wiebe (1928), and Wiebe was replaced by Coit A. Suneson (1936). This close relationship with USDA that benefitted cereals research continues today and has expanded to other crops.

The services of the Department of Agronomy to farmers were greatly enhanced by the seed certification program, later incorporated as the California Crop Improvement Association, to supply growers with pure seed of established agronomic crops and to provide a system whereby new varieties could be introduced and their varietal identification kept intact. Frank G. Parsons (1937) was brought into the department to manage this program.

The College of Agriculture at Davis was established on July 1, 1952, as a part of the reorganization plan of the University of California, which was approved by the Regents on March 30, 1951. The reorganization of all the university's agricultural activities by the establishment of a university-wide Division of Agricultural Sciences, under the direction of the Vice President for Agricultural Sciences, Harry R. Wellman, was approved by the Regents on September 19, 1952. This provided for coordination of the teaching and research on the four campuses which had agricultural programs (Berkeley, Davis, Riverside and Los Angeles). Fred N. Briggs was the first dean of the UC Davis College of Agriculture and assistant director of the Agricultural Experiment Station. James H. Meyer was named Dean of the College of Agriculture and associate director of the Agricultural Experiment Station in 1963.

When the college was established there were 17 departments, 10 of which operated initially as joint departments with UC Berkeley. Three departments; nematology, biochemistry and biophysics, and animal physiology; were later added. In 1952, these departments supervised 10 curricula with 20 majors. Four curricula were added, including agricultural business management, agricultural production, international agricultural development, and range management. In 1965, the faculty revised and consolidated curricula to include agricultural biosciences, agricultural economics and business management, agricultural education and development, agricultural science and management, family and consumer sciences, food science, and soil and water science.

When the College of Agriculture at Davis was established in 1952, there were 252 non-degree, 645 undergraduate, and 147 graduate students enrolled. By the fall semester, 1964–1965, there were 1,019 undergraduate and 598 graduate students; 326 of the graduate students were working for the Ph.D. degree.

The greatest growth in staff followed World War II. In 1952, there were 233 budgeted full-time equivalent academic positions in agriculture. This increased to 388 by 1964–65. This growth was required for teaching in more specialized areas of agriculture and some of the sciences basic to agriculture, and was also a response to research needs. The continued expansion of responsibility in these two areas led the Regents to designate the Davis campus as the principal center for agricultural teaching and research in a statement of policy at their meeting on October 23, 1959. In 1959 the Board of Regents declared UC Davis to be a general campus of the University of California.

### **Cooperative Extension**

In 1914, Congress passed the Smith-Lever Act which established Agricultural Extension, and mandated that each state co-locates its extension program with its land-grant

university. In 1915, California accepted the provisions of the Smith-Lever Act that established the Agricultural Extension Service and authorized county boards of supervisors to expend funds to support county extension offices and staff. (In 1974, the University of California changed the name from Agricultural Extension to UC Cooperative Extension.)

The first Agricultural Extension director, Bertram H. Crocheron, required that an organized agriculture group be established in a county before a farm advisor could be placed there (Crocheron 1914, 1915, and 1917). In 1913 Humboldt County formed the first county Farm Bureau, followed by Yolo, San Joaquin, and San Diego counties. In 1919 the California Farm Bureau Federation was formed, and it took over the establishment of the county Farm Bureaus.

On December 10, 1917, Director B.H. Crocheron appointed Burle Jones to be farm advisor for El Dorado County because of his horticultural background. In 1929, Jones transferred to Shasta County where he served as farm advisor until 1935. From 1936 until his retirement in 1947, Jones worked as an Assistant Professor of Agricultural Extension in the Department of Agronomy to successfully develop range and pasture programs (Miller 1968).

In 1936, Milt Miller was appointed farm advisor in Ventura County. He held this position until 1941 when he took military leave to serve in the U.S. Army during WWII. He was stationed in Australia where he served as a technical advisor to the Army and the Australian Government on food production. After the war, Miller was assigned to the College of Agriculture at Davis (which itself had been closed during the war) as Coordinating Extension Agronomy Specialist. In 1949 he transferred to Glenn County where he re-established the extension office. He returned to UC Davis in 1955 and served as extension agronomist until 1964 when he was named assistant state director. In 1966, Miller returned to his extension agronomist duties until his retirement in 1974.

In 1949, Vic Osterli joined the Division of Agronomy as an extension agronomist working on pasture and rangeland. In the 1950s several extension specialists joined the department, allowing them to become more specialized, and focusing on specific crops (Appendix A). Often county farm advisors transferred into the department's specialist positions. Some of these specialists had Ph.D. degrees but it was not required at that time.

These early extension specialists joined experiment station researchers in the Department of Agronomy and collaborated not only to find solutions to production

problems but to move new practices into on-farm production systems to the benefit of the state's farmers and ranchers. Combining disciplinary strength in genetics, plant physiology, soil fertility, and ecology, with applied knowledge of production processes for specific commodities has contributed to the Department of Agronomy and Range Science's worldwide reputation in teaching, research and extension.

In the 1970s, a Ph.D. degree became a requirement for new extension specialists. Jim Hill (rice) and Mel George (range and pasture) were among the first to be hired under this new requirement and they were eventually joined by Lee Jackson (winter cereals), Tom Kerby (cotton), Steve Temple (beans), Bill Liebhardt (sustainable agriculture), Steve Kaffka (sugar beets and oil seeds) and others.

### **Research Stations**

The first UC field station (now known as the Desert Research and Extension Center (REC)) was established as part of the agronomy department in the Imperial Valley in 1908. Over the years, the Desert REC was joined by other stations for agronomic research including the Intermountain and West Side RECs. The Hopland REC and Sierra Foothill RECs were added in the 1950s and 1960s and continue to be the site of rangeland and pasture research. These stations became an integral part of the research effort of the department and over the years the department has had experimental work located at stations from Tule Lake in Northern California to the Imperial Valley in Southern California. There has also been close cooperation with the USDA cotton station at Shafter and the industry-sponsored rice station at Biggs, California.

### **Post-War Growth**

In the early years of the division, the faculty was largely organized on a crop or commodity basis, with each member having a specialization such as plant breeding, crop physiology, or soil fertility. There were active programs on wheat, barley, rye grass, white and berseem clovers, all classes of dry beans, safflower and other oil crops, cotton, sugar beets, range improvement, seed certification, and foundation seed. Plant breeding was a major part of the department's research, with an active program in cereals, forages, food legumes and oil crops.

The Division of Agronomy, like the entire teaching program at Davis, was rebuilt after World War II and the faculty in the renamed Department of Agronomy grew rapidly in number, forming a young, energetic group, similar in age. Including a few faculty hired before WWII, this group included:

- Francis L. Smith (1931), beans
- R. Merton Love (1939), range improvement
- Ernest H. Stanford (1941), flax breeding, transferring to alfalfa research
- Frederick P. Zscheile (1946), biochemistry
- Doran C Sumner (circa 1943, seed production of grasses
- Luther Jones (1946), hay and small-seeded legume seed production
- Robert W. Allard (1946), lima bean breeding
- Horton M. Laude (1946), physiology of range plants
- Paul F. Knowles (1947), oil seed breeding and culture
- Charles W. Schaller (1947), cereal breeder
- Al H. Murphy (1946), range research and later superintendent of the Hopland Field Station (1951).

The post-war growth that started under Dr. Madson continued when F.N. Briggs became chair of the department from 1947 to 1952 and Madson was appointed Director of Field Stations. The reputation of the department as a research organization grew during this period. Hunt Hall (Figure 2) construction was completed, the number of graduate students increased, and additional staff members were added including:

- Maurice L. Peterson (1948), irrigated pastures
- Duane S. Mikkelsen (1949), soils and plant nutrition
- Burt Ray (1950), seed certification
- D.G. Smeltzer (1949), corn and sorghum breeding
- D. Ririe (1951), sugar beet production
- William A. Williams (1951), range legumes and crop rotation studies.



Figure 2. Hunt Hall

M.L. Petersen served as chair of the Department of Agronomy from 1952 to 1959 and further increased the areas of agronomic and botanical research by recruiting:

- Milton B. Jones (1956) to work on soil fertility and plant nutrition in California rangelands
- Robert S. Loomis (1956) to focus on sugar beets
- William H. Lehman (1956) to focus on alfalfa improvement in the Imperial Valley
- Ray A. Evans (1953), soil-vegetation survey of the range (succeeded by W.R. Powell in 1956)
- Demetrios M. Yermanos (1957), lima bean breeding located at the South Coast Field Station
- Robert B. Ball (1957) was appointed to the seed certification staff

R.M. Love served as chair from 1959 to 1970. During his tenure, the Department of Agronomy continued to build strength in traditional areas while moving into new areas

of research dictated by advances in science and introduction of new crops. Burgess L. Kay transferred to the department in 1959 and focused on range research. J.C. Williams (1961) was added to the cereal breeding program. F.T. Addicott (1961), a plant physiologist at UCLA, was transferred to the department to do basic research on the physiology of leaf abscission. With the advent of mechanical harvesting of cotton, it was necessary to remove the leaves prior to harvest. This research provided information essential to defoliation of cotton. R.E. Johnson (1961), a plant physiologist was added to the cotton group in support of this highly valued crop.

Other additions were:

- Cyrus M. McKell (1961), range research
- R.L. Sanchez (1961), lima bean breeding
- Beecher Crampton, curator of the Agronomy Herbarium
- Robert C. Huffaker (1961), plant physiologist
- V.Q. Hale (1961), plant physiologist located at West Side Field Station working on seed production of safflower and alfalfa
- Subodh K. Jain (1963), geneticist and population ecologist
- A.A. Holland (1963) legume-rhizobium microbiologist
- Charles A. Raguse (1963), irrigated pasture
- E.A. Oelke (1964), rice physiologist
- C.H. Werkhoven (1964), plant physiologist in safflower research
- O.E. Smith (1963), physiologist focused on growth regulators in cotton, a cooperative program with USDA.

In 1968, the name of the department was changed to Agronomy and Range Science (ARS) to reflect the inclusion of a program devoted to the management of rangelands, which constitute a significant portion of the state.

By the 1970s it was clear that rising human population numbers were increasing the demand for land and water resources that would impact agricultural production systems as well as society and the environment. Producing food for a rapidly growing world population and mitigating the impacts of food production on human health and the environment became leading national and world issues.

The Department of Agronomy and Range Science responded to these challenges by focusing on the structure and function of agronomic and other managed ecosystems to understand how natural processes and human management interact within the system

to control food production, resource use efficiency and environmental impact. Addressing both environmental and production questions required integration across diverse disciplines including molecular biology, genetics and genomics, plant breeding, animal and plant physiology, plant ecology, soil science, microbiology, and other related areas. Development of effective outreach programs that informed our traditional clientele and an increasingly urban population became critical to addressing environmental issues.

In the 1980s and 1990s special units were established to address production and environmental impact research. The Plant Growth Laboratory (PGL) was established to encourage basic research applying the latest advances in plant physiology and molecular biology. The PGL enhanced the department's mission by integrating basic research findings into the study of managed systems. The integration of PGL into Agronomy and Range Science (ARS) research provided a critical link between basic and applied sciences, laboratory and field research, disciplinary and integrated studies, and outreach necessary to implement products of this program. Ray A. Valentine, a molecular microbiologist, was appointed to the department and assigned to the Plant Growth Laboratory. This unit consisted of four ARS members (Ray A. Valentine, Ray Huffaker, William Breidenbach and Bill Rains).

In the 1980s interest in sustainable agriculture was increasing and the College of Agricultural and Environmental Sciences (renamed from the College of Agriculture in 1967) at UC Davis appointed a Committee on Sustainable Agriculture, chaired by Bill Rains, to review existing programs and plan for the future. Soon after, the University of California appointed a committee, also chaired by Bill Rains, to incorporate the interests and capabilities of other campuses. In 1986, at the request of the California Legislature, via a bill sponsored by Senator Nicholas Petris, the UC Sustainable Agriculture Research and Education Program (UC SAREP) was established. UC SAREP supported the development of research and education programs and was initially directed by Dr. Bill Liebhardt who was also an extension specialist in the Department of Agronomy and Range Science. The 100-year "Century Experiment" to study the impacts of farming systems and production inputs on agricultural sustainability was started during this period.

Molecular biology research in the 1970s and 1980s led to a new discipline in genetics called 'genomics.' By the 1990s, department scientists were pursuing gene DNA sequencing and bioinformatics to sequence, assemble and analyze the function and structure of the genomes of wheat (Jan Dvorak), beans (Paul Gepts), and cotton. Thea Wilkins was instrumental in establishing the National Science Foundation Cotton Genome Center at UC Davis. Applying genomics to other crops would follow.

Modelling and systems analysis also became an integral part of crop and rangeland systems following pioneering work on crop production modelling by R.L. Loomis and W. Williams. This work was furthered by Shu Geng, Richard Plant, and Emilio Laca. With the hiring of John Menke, Mel George, Kevin Rice, Tag Demment, and Emilio Laca, there was a renewed focus on the structure, function and management of rangeland ecosystems.

P.F. Knowles was chair of the department from 1970 to 1975 and he was succeeded by C.O. Qualset who served as chair until 1981. D.W. Rains was appointed chair from 1981 to 1987. They were followed by Don Phillips (1987–1988), Jim Hill (1994–1999), Chris van Kessel (2002–2004) and others.

Throughout these years, the department was organized along four broad disciplinary lines: 1) genetics, breeding, and genomics; 2) quantitative agronomy (applications of information technology to agriculture); 3) crop physiology and ecology; and 4) range and natural resource management. The department's ongoing challenge was to span the full spectrum of research from basic to applied levels. Faculty additions in the 1970s and 1980s strengthened research and teaching in plant breeding and genetics, plant physiology, crop and rangeland ecology, and modeling and systems analysis.

## **Graduate and Undergraduate Instruction**

Instruction in agronomy has been a high-priority activity of the department. It has evolved to address the changes taking place in California agriculture and society.

In the beginning, courses emphasized dryland wheat and barley production, but irrigated crops gradually became an important part of the early curriculum. At the time the Department of Agronomy was started, scientific knowledge related to agriculture was very limited compared to what it is now. Lacking extensive scientific knowledge, early courses were more descriptive and based on observation and experience rather than experimentation and scientific principles.

Starting in the 1920s, Dr. Ben Madson began to revamp agronomy courses and increase the teaching of science-based principles. A crop production course that emphasized the scientific basis for growing crops including the effect of weather, soils and irrigation on crop production was his first science-based course. Over the years, genetics and principles of plant breeding, plant physiology, molecular biology, microbiology, plant ecology, and soil science became an important part of the agronomy curriculum.

A comparison of courses offered in 1914 and 1964 indicates how advances in agronomy were reflected in courses the students took. In 1914 most of the students were non-degree, two-year and three-year students, with very few taking courses leading to a university degree. In two semesters of that year, 233 students were enrolled in agronomy. In two semesters in 1964, there were no two-year courses, 76 were enrolled in lower division courses, 117 in upper division courses, and 106 in graduate courses. In 1964, six agronomy majors graduated with a bachelor of science degree, nine with a master of science degree and six, who were trained by agronomy professors, earned the doctor of philosophy degree.

Beginning in 1953 the School of Forestry at UC Berkeley and the Department of Agronomy at UC Davis jointly offered a major in rangeland management. Faculty for the program included Arthur Sampson, along with recent faculty additions Harold Heady and Harold Biswell from the UC Berkeley School of Forestry; Merton Love, Horton Laude, and Bill Williams from the UC Davis Department of Agronomy; and William Weir from the UC Davis Department of Animal Science. Arnold Shultz at UC Berkeley and Beecher Crampton at UC Davis also taught in this joint program. Several graduate students also participated in teaching.

In addition to range science courses, the curriculum included courses in forestry, soils, agronomy, taxonomy, animal science, and a good breadth in the general sciences and liberal studies (John Stechman, personal communication 2012). In the early 1960s this joint program ended and the Department of Agronomy initiated a Range Management major in the late 1960s. The name of the department was changed to Agronomy and Range Science in 1968. By the late 1980s the range management major was no longer offered but a strong research and extension program remained.

## **Public Service Research**

The Department of Agronomy and Range Science's close connection to commodity groups and other agricultural associations, county farm advisors, and government agencies has been integral to its mission of public service research and teaching. While farmers and ranchers were the department's original focus, over the years the department has been involved with a diverse group of stakeholders including:

- Federal agencies (USDA Forest Service and USDA Natural Resources Conservation Service, USDI Bureau of Land Management, US Department of Defense, and others)

- State and local agencies (California Department of Food and Agriculture, California Department of Forestry and Fire Protection, Department of Transportation, Department of Fish and Wildlife, many water districts, and various other local and state agencies)
- Commodity boards (rice, wheat, cotton, dry beans, alfalfa, sugar beets, and oil seeds)
- Agricultural associations (California Crop Improvement Association, Farm Bureau, California Cattleman's Associations and others)
- Industry groups (canners, millers and other food processors, textile, storage, shippers, marketers and seed producers)
- University programs (California State Universities, Kearny Foundation, UC Natural Reserve System, UC Statewide Integrated Pest Management Program, UC Agricultural Issues Center, UC SAREP, UC Water Resources Center, UC Davis Genetic Resources Conservation Program, and 4-H).

These stakeholders, through their association with department faculty and county farm advisors, continually communicate research needs and help the department maintain a progressive research and extension agenda. Many of the stakeholders provide research funds to solve specific problems and all have access to information developed by research efforts within the department. The beneficiaries of our research programs are the state's agricultural and conservation users, the general public, and users beyond California.

Often the department's research and education programs have influenced public policy. This became increasingly important as the researchers and extension agents began to address environmental issues associated with pest management, grazing on public lands, watersheds and water quality, conservation of genetic resources and biodiversity, restoration of ecosystems, food safety, and issues associated with the long-term impact of agricultural systems.

Focusing on agronomic crops including winter cereals, rice, beans, cotton, oil seeds, forage, other crops and rangelands, the Department of Agronomy and Range Science was recognized worldwide as the place to go in the UC System for information on crop production, cropping systems and rangeland ecosystems. The department's ability to address stakeholder needs was characterized by 1) a long-term consistent focus on specific crops, cropping systems and rangeland ecosystems, 2) collaboration of faculty

with expertise in the many disciplines including molecular biology, genetics and genomics, plant breeding, animal and plant physiology, plant ecology, soil science, microbiology, and other related areas, and 3) integration of basic and applied research with extension education programs to facilitate the adoption of new cultivars, practices and management systems by agricultural producers, managers and policy makers.

There are at least three ways that the research and extension agenda in the Department was affected by stakeholders. First, the department's close collaboration with commodity groups led to funding of department research projects. Grower members of the commodity groups have taxed themselves through marketing acts and then developed research agendas directed at problems associated with their commodity. The process involves a board made up of growers, industry representatives and representatives of UC Agricultural Experiment Station (AES) faculty, a technical advisory board made up of AES faculty and Cooperative Extension, and the solicitation of researchers to submit proposals that address problems identified by the commodity board. The proposals are reviewed by the technical advisory board and recommendations made to the growers' board on the quality of the proposal. The growers then decide which proposals are funded.

Second, the AES faculty also responds to "requests for proposals" published by governmental agencies and private non-governmental organizations (NGOs). These announcements provide information on research objectives defined by the agency and if they fall within the mission of the department and expertise of the faculty member proposals maybe submitted.

Finally, the research agenda is also shaped by national research funding initiatives from the National Science Foundation (NSF) and USDA that reflect national research priorities. USDA competitive grants for national priority issues have been important sources of funding for research on many crops and rangelands. For example, genomic projects, especially wheat and cotton, have been greatly advanced through funds from the National Science Foundation, USDA National Research Initiative, and private foundations such as the McKnight Foundation and Wallace Genetic Foundation. Water quality funding from the U.S. Environmental Protection Agency and USDA became import funding sources in the 1990s. Projects on grassland restoration, and the impact of climate change on soil carbon storage have received funding from national competitive grants.

While research directions are influenced by stakeholders, the level of the influence is often reflected in the funding available. Funding from stakeholder organizations often

provides the “seed money” to initiate new lines of research that frequently lead to a larger effort when it matches disciplinary areas of the individual Agricultural Experiment Station faculty. Stakeholders and the general public benefit from this activity.

From the earliest years, collaboration with scientists in other departments, colleges, and universities has been a hallmark of the Department of Agronomy and Range Science. Over the years there have been extensive collaborations with faculty in Animal Science; Land, Air and Water Resources; Plant Biology; Vegetable Crops; Weed Science; Nutrition; Environmental Sciences; Molecular and Cell Biology (joint faculty member); Agricultural and Resource Economics; and Veterinary Sciences; along with statewide programs including the Agricultural Issues Center, Integrated Pest Management (IPM), Genetic Resources Conservation Program, Sustainable Agriculture Research and Education Program (SAREP), and Small Farm Center.

These collaborations that leverage expertise from other departments and programs enhance the ability of the university to address issues identified as important by the faculty in agronomy and range science, and they strengthen the department’s research, teaching and extension programs, contributing to the department’s reputation worldwide.

## **Postscript**

In 2004, the Department of Agronomy and Range Science at UC Davis was consolidated with three other departments (Environmental Horticulture, Pomology, and Vegetables Crops) to form a new broadly-defined Department of Plant Sciences, with Chris van Kessel as its first chair. This department continues to develop new knowledge for innovation in crop production and rangeland management.

## **The Authors**

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