**Position title:** Nutrient and Irrigation Management in Vegetable Crop Production Systems Specialist

**Position description:** This position will provide statewide research and extension leadership in the development and adoption of precision systems for improved nutrient and irrigation management in vegetable crops for enhanced production efficiency and environmental protection. A PhD in horticulture, agronomy, soil science, soil-water-plant relations, agroecology, or closely related discipline will be required. Experience in vegetable production, nutrient management, and interdisciplinary research is desirable. The Specialist will work with CE Specialists and Advisors statewide, with AES faculty in Plant Sciences and departments at UCD such as Land, Air and Water Resources, Biological & Agricultural Engineering and Agricultural & Resource Economics, UCR, and programs such as the Agricultural Sustainability Institute and Institute for Water Resources.

**Justification:** California produces 58% of all US vegetables with a 2015 value of $8.3 billion. Although numerous challenges to the vegetable industry exist, the management of plant nutrient and water supply, alongside high labor costs are the key issues in a future resource-constrained agricultural landscape. As vegetable production systems intensify and yield/quality expectations rise, nutrient management practices are continually updated to maintain production and quality. Efficiency of nutrient management depends on efficient water management. Therefore, the Specialist will link nutrient and irrigation management to provide precision solutions that integrate the latest technological development contributing to sustainable nutrient and water use. Advancements in fertilizer technology, and in soil and plant nutrient monitoring, need to be evaluated and integrated into existing production systems. Fertilizer resource depletion, and soil health are also significant sustainability issues. Most importantly, increasing regulation of nutrient management both for water quality protection and greenhouse gas (GHG) reduction presents a challenge to the vegetable industry. Vegetable growers are under increasing regulatory scrutiny for nitrate (N) pollution of ground and surface waters. N use reporting to Regional Water Quality Control Boards, will require improvement in N use efficiency. Additionally, the connection between N management, irrigation, nitrous oxide emissions (a GHG) and nitrogen dioxide emissions (a pollutant) have drawn regulatory scrutiny. Labor, shortages demand increased labor use efficiency for harvest and other activities, likely to incorporate new automated solutions. The Specialist will provide leadership in cropping systems management to improve plant stand and harvest uniformity. This position addresses core concerns of the *Sustainable Food Systems* and *Water Quality, Quantity and Security* ANR strategic initiatives.

**Extension:** This specialist will provide leadership and coordination among UC faculty, CE Specialists and Farm Advisors on matters relating to vegetable crop nutrient and irrigation management. In addition to contributing to existing outreach structures (UC Research and Information Centers, UCCE workgroups, Commodity Research Boards, etc.), this individual may cooperate with USDA, NRCS and Resource Conservation District personnel to expand educational programs. Clientele groups served will include vegetable producers, Certified Crop Advisors, Water Quality Coalitions and regulatory agencies. While educational programming on the agronomic aspects of nutrient management represents a continuation of long-standing UCCE efforts, this position will be unique in the emphasis on integrating agronomy and environmental protection. This Specialist will be the lynchpin of UC’s efforts to inform regulatory policy and guide the industry’s response to these important environmental issues.

**Research:** Research will focus on maintaining economically viable vegetable production while improving resource and labor use efficiency and reducing the impact of nutrient discharges. Areas of inquiry include irrigation/nutrient management interactions, fertilizer technology, crop and soil nutrient monitoring, soil nutrient cycling, decision support software and remediation of nutrient discharges in conventional and organic systems. It is anticipated that systems-oriented research would be pursued, holistically evaluating farm management practices and nutrient discharge. Cropping systems research could include strategies to increase use of transplants to improve labor, harvest and resource use efficiency. Publication outlets include scientific journals in horticulture, soil science and environmental science as well as industry trade magazines, both print and electronic.

**ANR network:** Many AES scientists are involved in various aspects of crop production and nutrient management, including agricultural sustainability, economics, engineering, entomology, environmental protection, irrigation, plant breeding, plant pathology, plant physiology, post-harvest, and soil fertility. Although the emphasis will be on vegetable crops, management principles developed will be extended to other crops through collaboration with other scientists. The Specialist will contribute to UC ANR’s public values in the areas of safe and healthy food and environments, innovation implementation, and climate resilience and will be in a position to build multi-disciplinary teams to address complex agronomic and environmental problems associated with nutrient and irrigation management.

**Network external to ANR:** Vegetable crop production, nutrient and irrigation management is of interest to State and Federal regulatory agencies that are concerned with reducing N contamination in ground and surface water or minimizing GHG emissions. This Specialist will be an essential resource to inform regulatory agencies (i.e. statewide or regional Water Quality Control Boards, CA Air Resources Board, US EPA), and to interact with USDA colleagues of similar interests. Additionally, a number of groups (Resource Conservation Districts, Water Quality Coalitions, environmental organizations, etc.) are involved in environmental monitoring and remediation projects across the state and this Specialist will provide technical expertise and coordination of efforts. Vegetable crop production and nutrient management are of interest to researchers in other states such as Arizona and Florida, and there is ample opportunity for multistate collaboration.

**Support:** The Plant Sciences Department at UC Davis will provide office, laboratory, field and greenhouse facilities, administrative support, and information technology services. Financial support would include a startup package and an annual CAES allocation for CE Specialists. Most funding for research and outreach activities will come from external sources.

**Other support:** Numerous sources of financial and logistical support will be available to this position. These include commodity research Boards (celery, leafy greens, garlic & onion, processing tomato, potato, pepper, melon, carrot, etc.), most of which support nutrient and production research. State support will be available from the CDFA Fertilizer Research and Education Program, statewide or regional Water Quality Control Boards, and the Air Resources Board. Federal grant programs for Specialty Crops, Sustainable Agriculture, Organic and Watershed studies will also be available for support. Projects demonstrating improved nutrient management practices at a farm scale may also be attractive to NRCS conservation programs.

**Location:** UC Davis, Dept. of Plant Sciences. This location has key collaborators in crop production, nutrient management, irrigation and environmental protection as well as access to specialized laboratory services, training of graduate students, and policy makers in Sacramento.

**Developed and proposed by:** Position was developed by the Dept. of Plant Sciences and the ANR Vegetable Crops Program Team. External stakeholder groups consulted include the CA Leafy Greens Research Board, the CA Tomato Research Institute, CA Garlic & Onion Research Board, CA Carrot Board, USDA NRCS, CA Specialty Crops Council and the CA Water Resources Control Board.