

UCCE Water & Soil Program Initial Needs Assessment

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Background

The UCCE Water & Soil Program provides outreach and applied research in agricultural water management for cultivated crops including winegrapes, orchards, and diversified vegetables in Sonoma, Napa, Mendocino, and Marin counties. The program's goal is to improve on-farm water management while stewarding soil health, meeting local regulations, and increasing resilience to environmental extremes. Prospective outcomes include improved water use efficiency and sustainability, increased research of innovative technologies, collaborative community partnerships, and enhanced knowledge on the interconnectedness of climate change, water and agriculture. Through technical assistance, science driven education, and targeted research efforts, the program promotes the protection of water quantity, quality, and soil health.

This needs assessment will guide program development and ensure future programming remains relevant to regional growers. Ongoing assessments will identify evolving challenges and barriers in agricultural water management and inform research and educational efforts.

Needs Assessment Findings

This needs assessment was performed during the first year of the Water & Soil Program in 2025. Data from farmers and agricultural stakeholders were collected through semi-structured interviews, site visits, outreach events, and an online survey. Information from 66 formal responses along with ~50 informal meetings and conversations were analyzed. Results are reflective of assessment participants, if you would like to contribute your thoughts please reach out to Helaine Berris at hmberris@ucanr.edu.

The surveyed region includes diverse cropping systems, management practices, and microclimates. Winegrapes are the dominant crop, with an estimated 121,644 producing acres across Sonoma, Napa, Mendocino, and Marin counties, followed by olives, apples, pears, and diversified vegetables. This variability drives complex and wide-ranging agricultural water management needs.

The top 4 water and soil challenges listed in order of greatest importance were reported as -

1. Irrigation systems (design, efficiency, scheduling)
2. Water policy and regulation
3. Soil moisture management
4. Erosion control

The top 3 needs that would help farmers address these challenges were reported as -

1. Financial resources
2. Technical resources
3. Information and knowledge sharing

The top 3 topics that farmers are interested in learning more about were reported as -

1. Soil health practices
2. Irrigation efficiency
3. Irrigation sensors and equipment

Irrigation Management

Irrigation is a top priority for most farmers, however specific challenges vary depending on the cropping system. Many small farms including fruit, vegetable, and small family vineyards, are interested in learning more about irrigation infrastructure, design, and maintenance. For example, drip vs sprinkler irrigation, emitter emission rate and spacing, filtration systems, and water supplies (wells, ponds, recycled water vs city water) were commonly mentioned topics. Identifying and addressing poor distribution uniformity is a common challenge in vineyard systems, especially when spot maintenance has been performed or vineyard management has changed.

Some farmers need guidance on irrigation scheduling. Irrigation timing, frequency, and quantity is commonly based on intuition, visual cues, and historical management. Many growers prefer the latter methods while others want tools that support site-specific irrigation needs, such as automation, soil-moisture sensors, remote sensing data, and apps. Many have tried these technologies, however, cost, complexity, and maintenance remain major barriers. There is also interest in deficit irrigation and dry farming strategies for vineyards. Vineyard irrigation scheduling is further complicated by the need to achieve specific fruit qualities for winemaking such as imposing water stress at specific growth stages. Overall, many farmers find existing scheduling tools too complex, highlighting the need for simple, practical options.

Questions about crop-specific water requirements were common, however these are highly dependent on environmental and management conditions. Although evapotranspiration (ET) is the recommended method for estimating water requirements and guiding irrigation scheduling, the region's microclimates and complex topography limit its reliability for many farms and vineyards.

Water quality is another frequent concern, particularly iron, boron, and interpreting general water-quality tests. Farmers want help understanding crop toxicity thresholds, how water quality affects system performance (e.g., clogging), and how to design and maintain irrigation systems based on their water source.



Fig 1. From left to right: olive irrigation, annual vegetable irrigation, vineyard irrigation, and soil moisture sensor demonstration.

Soil Health & Soil Moisture Management

Soil health is a top priority for farmers across all cropping systems. Farmers want soil management practices that optimize soil moisture management such as tillage manipulation, cover crops, and amendments trials. While most vineyards already cover crop or allow resident vegetation between vine rows, farmers are curious about the impacts of specific species and management practices on soil moisture. Farmers want to better understand how to make soil health decisions based on the site specific conditions of their farm. Serpentine soil management was mentioned multiple times by farmers but is isolated to specific regions.

Groundwater recharge was a common theme brought up by growers and agricultural stakeholders. With the Sustainable Groundwater Management Act (SGMA) and the establishment of Groundwater Sustainability Agencies (GSA), growers and agricultural partners are exploring on-farm practices that enhance infiltration, reduce runoff, and support Flood-MAR research. Additional soil health needs include help with soil testing and interpretation, amendment recommendations, soil microbe management, and erosion control.



Fig 2. From left to right: soil sampling using soil probe, upland vineyard soil, lowland cover crop soil, soil water infiltration testing.

Policy and Regulation

Policy and regulation are major challenges for farmers due to unclear agency roles, perceived overlap, and confusion around monitoring and reporting requirements. Many growers shared how regulatory complexity has resulted in a general sense of uncertainty around policy implementation. Monitoring and reporting are essential for environmental protection, but farmers need clear, streamlined standards that reduce duplicative activities.

There are multiple avenues for research and education in the water policy space. The region's Groundwater Sustainability Agencies (GSA) are working hard towards compliance with CA's Sustainable Groundwater Management Act (SGMA). The Regional Water Quality Control Board's recently approved Vineyard Order will seek to protect surface water quality through required farm practices and discharge monitoring. The State Water Resources Control Board is deliberating the appropriateness of statewide nitrogen application limits. These entities have noted collaborative opportunities such as groundwater-recharge research, improved crop consumptive-use estimates, and joint workshops, events, and farmer resources.

Water Resiliency & Preparedness

Water security is a major concern across the agricultural community and was commonly mentioned in relation to other challenges. Growers, technical advisors, and regulators are working to improve drought preparedness at both field and regional scales. Farmers want to boost water-use efficiency, increase storage, diversify water supplies, and adopt the on-farm irrigation and soil health practices described above.

More resources are needed on the cost, permitting, regulatory requirements, and maintenance associated with water supply projects. New wells or ponds require multiple agency reviews, and many existing irrigation ponds have unknown sediment levels and volumes. Unclear permitting pathways for pond dredging and maintenance further restrict management and hinder regional drought planning.

Growers also seek resources to better prepare for wildfire and extreme heat. Mentioned topics include how fire impacts soil health and irrigation infrastructure, and how a dependable, diversified water supply, and fire-resilient practices can help lessen wildfire impacts.

For more resources see the [UCCE Water & Soil Program webpage](#).