

American farmers lead the way in tackling water scarcity

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Facing unpredictable climate, dwindling water supplies, and rising costs, American farmers are rethinking water usage. Carlos Suárez, Chair of the U.S. Sustainability Alliance, discusses how they are rewriting the rules of water

Faced with climate volatility, water scarcity, and rising input costs, farmers in the United States (U.S.) are achieving real results with water management innovations. Producers across the U.S. continue to respond to the challenges of how food needs to be grown, and their experiences are proving that innovation can meet resource constraints.

Water use reductions of 20-40% are being achieved on working farms while yields are maintained or even improved. This is not simply a reaction to government regulation. It is the result of producer-led innovation that achieves tangible environmental and economic returns.

The forces behind the change

Three converging pressures are driving this innovation. First, the climate has become unpredictable. California almond farmer Christine Gemperle explains: “We’ve moved into this pattern of weather where we’re seeing either feast or famine – a year with 200% of normal rain followed by three years of drought.” For permanent crops requiring 25- to 30-year investments, this demands systems capable of maximizing capture during wet periods and stretching supplies through dry ones.

Second, the economics have become impossible to ignore. Rising energy costs, increasing water prices in traded markets, and intensifying competition from urban and industrial users are making the old irrigation model untenable. And the cost-to-performance ratio of precision agriculture technology has reached a tipping point. What once demanded six-figure investments and specialist expertise can now be implemented far more easily and cost-effectively.

Third, technology has caught up with the need. Satellite imagery, wireless sensor networks, artificial intelligence-driven data analytics, GPS guidance, and advanced materials science – all combined with agronomic knowledge – enable unprecedented precision in water management.

Precision irrigation: From mechanized to intelligent

When center pivot irrigation was introduced in the mid-twentieth century, it transformed large-scale farming. But traditional systems operated with the same water application rate across an entire field regardless of soil variability or microclimatic conditions. However, since the 1990s, growers in key states such as Nebraska have begun a ‘crop-per-drop’ revolution, where total water withdrawals for soybean and corn production have remained flat or decreased, as total yields have soared even after four decades.

Today, modern Variable Rate Irrigation (VRI) adjusts application rates for individual zones in response to differences in soil type, topography, and crop development stage. Platforms such as [Lindsay Corporation’s FieldNET Advisor](#) combine weather forecasts, soil moisture sensors, satellite-derived crop stress indicators, and agronomic models to automate irrigation levels. The newest generation of systems represents, in the words of Lindsay Corporation’s Gustavo Oberto, “a self-aware, always-there robot in the field, capable of at-scale crop health management.” Water savings of 15-30% are commonly achieved, cutting pumping costs and enabling irrigation of larger areas with less water.

Genetics: Building drought resilience from the seed up

Plant genetics can determine how efficiently crops use water. Varieties now in commercial use grow deeper root systems that reach more moisture. Modified leaf characteristics reduce transpiration. The cumulative effect is significant. Modern corn hybrids, for example, produce considerably more grain per unit of water consumed than older varieties. This is especially important in helping growers mitigate production risks, given the expected volatility in future weather patterns.

Innovation in action: Three farms, measurable results

The 20,000-cow [McCarty Family Farms dairy operation](#) in Kansas built the only on-farm milk condensing plant in North America. It reclaims approximately 100,000 gallons of water each day from the evaporative condensing process. The water that cools the raw milk is reused throughout the operation – as drinking water for the cows, for cleaning the barns and irrigating crops, creating a closed-loop system. By integrating precision irrigation systems using Variable Rate Technology and soil sensors, the farm produces 30% more milk per cow with fewer inputs.

[Christine Gemperle](#), a grower in California's Central Valley, farms 135 acres of almonds in one of the world's most water-stressed growing regions. During the 2012–2016 drought, she achieved a 20% annual reduction in water use while protecting her prime-age trees. Her techniques combine micro-drip irrigation directly to individual trees, strategic deficit irrigation that applies water only when crop physiology demands it, cover cropping that builds soil water retention over time, and a UC Davis partnership breeding trees better adapted to local salinity conditions. Most recently, she participated in a groundwater recharge pilot during California's 2023 storm series, intentionally flooding her orchard to replenish aquifers. By her own calculation, she returned twice as much water to the aquifer as she extracted during the growing season.

[Scott Matthews](#), based in Arkansas, farms 1,800 acres of rice and soybeans in what is now a designated critical groundwater area. Over three decades, he has achieved a 40% reduction in water use through an evolving system. Tailwater recovery captures irrigation runoff for reuse. Precision leveling ensures fields drain and flood uniformly. Multi-inlet rice irrigation (MIRI), calibrated using GPS field measurements and drone-captured elevation data, distributes water efficiently across each paddy. Thanks to these irrigation practices, runoff during the growing season has become rare, and Scott's tailwater recovery system now deals with less water than it was originally designed for.

A competitive advantage, not just a conservation goal

As international markets increasingly prioritize sustainability credentials, water efficiency strengthens the competitiveness of U.S. agricultural exports. This matters particularly as agricultural exporters compete on more than just price and quality.

Water stewardship is, arguably, central to agricultural success. With freshwater representing less than 3% of Earth's total water supply and agriculture its largest consumer, innovations such as those highlighted in Kansas, California and Arkansas demonstrate how the world's most productive farms will need to operate in the future.

Further reading: [Water Stewardship in U.S. Agriculture: Innovations for a](#) Changing Climate

This is U.S. Sustainability: A deep dive into water conservation

Tune in to the U.S. Sustainability Alliance podcast on water conservation to hear how farmers in Arkansas and California are adopting water-saving strategies to address climate change. Learn more about the intricacies of multi-inlet rice irrigation, the benefits of whole orchard recycling, and how groundwater banking could be the future.

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