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Navigating the challenges of climate change in viticulture: exploring AI, water management, and climate resilience

Exploring cutting-edge solutions for water management, carbon sequestration, and precision viticulture in the face of climate change

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In the wake of escalating climate challenges, viticulture faces transformative disruptions that call for forward-looking solutions. The recent Growing Forward Vineyard & Grower Virtual Conference, held on July 19, highlighted the vital intersection of water

management, the mounting impacts of climate change, and the groundbreaking role of artificial intelligence (AI) in shaping the future of vineyards.

One of the main challenges exacerbated by climate change is water management. As the globe grapples with the dual threat of more recurrent, prolonged droughts and on the other end, extreme heavy rainfall, there's an intensified urgency to reconsider and restructure irrigation strategies. Mark Greenspan, a leading figure and president at Advanced Viticulture, pinpointed soil moisture sensors and tensiometers as game-changing technological solutions for these climate-induced inconsistencies.

Yet, as Steve Vierra, overseeing vineyard operations at Derby Wine Estates in Paso Robles, Calif., observes, the essential philosophy of irrigation has remained consistent. The true test lies in adapting and recalibrating practices in the face of new and unpredictable challenges.

Lending more nuance to this discourse, JT Jaeger from Jackson Family Wines expanded on the invaluable role of historical soil moisture data. By integrating past records, vineyard owners can sharpen their irrigation strategies to ensure that the soil remains at its optimal moisture levels throughout various growth phases. Tensiometers, revered for providing real-time water potential metrics, have emerged as a more precise counterpart to traditional techniques, such as weekly pressure bombings.

While technology provides a myriad of tools, Mike Anderson, a seasoned viticulture consultant at Peake Ranch Winery, underlined the paramount importance of expertise in interpreting this data.

Charting the Path for Climate-Conscious Vineyard Practices

Transitioning to the arena of eco-conscious viticulture, the spotlight turned to practices that enhance carbon sequestration and minimize carbon emissions. The groundbreaking initiative by the California Land Stewardship Institute's Fish Friendly Farming Environmental Certification offers collaboration with vineyards to assess the environmental efficacy of their farming techniques.

Laurel Marcus, the institute's executive director, elucidated the foundational role of soil composition in carbon capture, emphasizing the potency of clay and silt-rich soils.

Demonstrating this in practice, Brad Petersen's eco-initiatives surrounding Silver Oak Cellars' Alexander Valley Winery are commendable. Not only has the vineyard integrated solar energy, but it also champions wastewater treatments using membrane bioreactors and has instituted advanced steam systems for rigorous barrel sanitation. Their innovative approach to tilling — only every other row — has been shown to amplify carbon sequestration without compromising grape quality.

Equally pioneering, Riggs Lokka at Emeritus Vineyards has integrated native shrub hedgerows and dry farming techniques, surmounting the challenges posed by sandy soils. On a similar note, Tyler Klick of Redwood Vineyard Management has harnessed natural tree-based carbon sequestration complemented by no-till protocols and winter grass cover crops.

The AI Revolution in Viticulture

Tom Shapland, the brain behind Tule, demystified AI for attendees. Tule Vision's unique AI-driven methodology, which harnesses iPhone imagery, measures evapotranspiration to render irrigation recommendations. This harmonizes with the water stress profiles of the vineyards.

Detailing the practical application, Carlos Danti and Margarita Postoronca of Chandon outlined their journey with Tule and HotSpot Ag. This precision irrigation framework seamlessly incorporates Tule's AI directives, culminating in a water-efficient vineyard model.

However, the application of AI is not without its challenges. While the technological data influx is overwhelming, a gap remains in translating this information into actionable vineyard strategies. Yet, Shapland remains optimistic, envisioning broader AI applications such as adaptive tractor adjustments during pruning phases.

As the unpredictable nature of climate change continues to redefine the boundaries of viticulture, an amalgamation of technology, adaptability, and environmentally conscious farming is the beacon that promises to guide vineyards through to the future. Embracing these innovations is not just a matter of industry progression; it's an imperative to ensure that the rich legacy of viticulture thrives for generations to come.