Microclimates Goes Outdoors: Advancing Precision with Smart Agriculture

By **Neda Vaseghi**, CEO | Editor **Morgan North**

09/10/24

The Microclimates team recently visited Hurst Greenery in Westboro, Missouri, to collaborate with owner Blake Hurst on installing an outdoor weather station and soil moisture sensors for corn and soybean fields. This project represents a seamless transition for Microclimates into outdoor agriculture, thanks to the platform's robust foundation designed for easy deployment in precision agriculture settings, whether indoors or outdoors. By extending its advanced monitoring and automation capabilities beyond controlled environments, Microclimates is poised to bring the same level of precision and efficiency to open-field farming, enhancing crop management through predictive weather and environmental data.

The original opportunity to automate Hurst's greenhouses was brought to Microclimates Inc. two years ago by partner Trilogy Networks, in conjunction with Veea, Inc. Today, over 20 greenhouses at Hurst Greenery are fully monitored and automated through Microclimates' unifying controls platform and UI, utilizing LoRaWAN (low power, wide area network protocol designs to wirelessly connect battery operated "things" to the internet).

As Blake from Hurst Greenery explains, "The main benefit of Microclimates is the remote monitoring—being able to 'see' inside each greenhouse from anywhere and receive critical alarms and

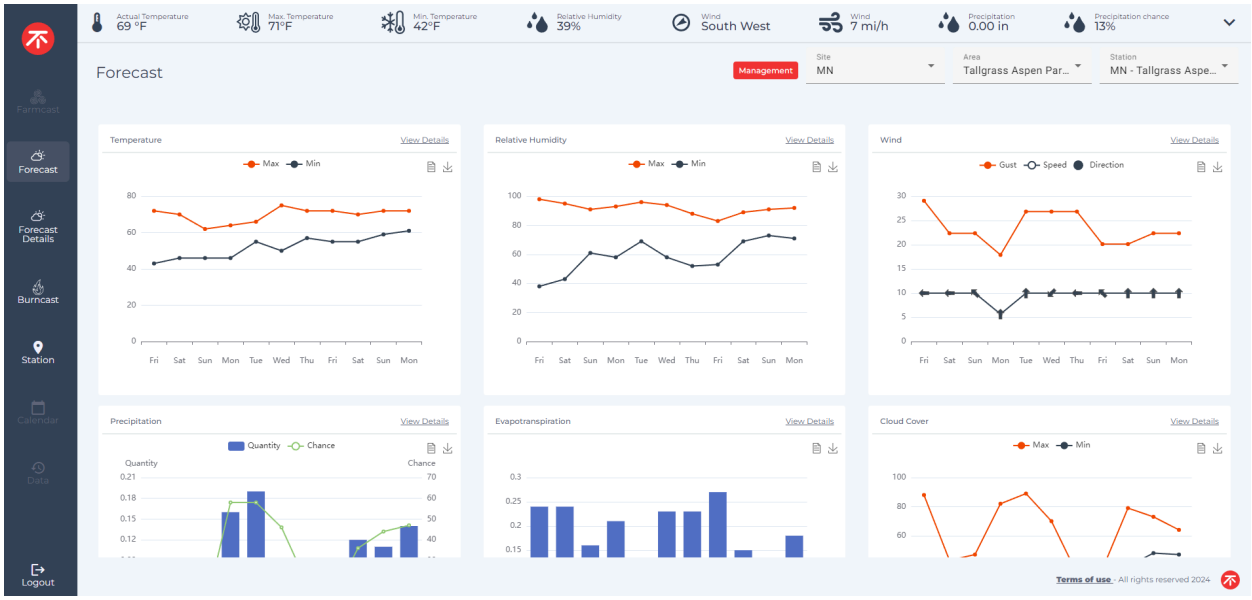
warnings. This functionality is mission-critical for our business, ensuring we avoid catastrophic losses that traditional systems just can't prevent."

Producing Hyper-Local Weather Insights

Typically, outdoor farmers rely on insights from local weather stations to minimize crop loss. However, according to Blake Hurst, relying on local weather forecasts alone is not sufficient to predict the environmental risks and needs of outdoor crops. Compensating for risk and crop loss leaves a budgetary gray area in a farm's financial profile already; consistent discrepancy between local weather data and site-specific weather data makes that gray area wider. Even minor discrepancies between generalized area insights and an operation's on-site conditions may require significant overcorrection to account for. It is challenging for farmers to undertake truly impactful short-term risk prevention measures based on weather predictions. Growers must account for risk prevention based not on the accuracy margin of predictive weather, but on the accuracy margin of predictive weather non-specific to their own location.

Microclimates and Benchmark Labs strive to narrow this margin at Hurst Greenery. A small roof-mounted LoRaWAN weather station gathers environmental data on the day-to-day conditions of the farm. Where Benchmark comes in is their groundbreaking AI algorithm, which takes the data Microclimates consolidates from the installed sensors to produce a hyper-local, hyper-specific 15-day forecast of weather conditions on the farm. The integration of Microclimates with Benchmark elevates precision agriculture to predictive agriculture.

By mapping the unique environment data of the farm itself, it is possible to ensure much more accurate insights into temperature, humidity, wind speed, soil moisture, etc.—all factors that go great lengths towards determining how a farmer calculates risk, efficient use of budget, and best practices to maximize yield. Highly specialized insights translate into highly accurate future predictions, giving farmers like Hurst the freedom to implement smarter and more confident strategies to protect their crops, and increase the overall value of their harvest.



Future Applications for Outdoor Monitoring

Looking towards the future, Microclimates Inc's next project with Hurst Greenery is to install remote monitoring for grain bins in Missouri and separate projects in Indiana. Today, farmers manage grain bin conditions using a range of methods, from conducting daily manual checks of temperature, humidity, and CO2 levels to utilizing advanced remote monitoring systems that provide real-time data and alerts. The ideal solution is a smart climate system that features remote climate monitoring and automated fan control based on predefined thresholds. This system offers farmers improved predictive accuracy, energy savings, and real-time alerts for any out-of-specification conditions.

Microclimates is innovating towards automating this process and increasing its reactivity, employing LoRaWan communication sensors to provide remote monitoring and fan controls. Smart alerts will notify operators on detrimental changes to bin conditions as soon as they present, based on the data gathered through these sensors. The measurement of C02 is especially critical, as detecting increases in C02 levels can be an indicator of mold growth, which can introduce mycotoxins to stored crops and cause crippling grain loss. The ability for a farmer to monitor these factors altogether through one comprehensive platform and remotely control fan systems cuts down the risk of grain loss and mold growth significantly. It provides a much greater degree of responsiveness for the operation overall.

The primary benefits of smart agriculture and environmental automation are the data-driven, energy-efficient, and cost-effective decisions it empowers growers to make about their operation. More precise data insights and environment controls lead to more successful crop yields, which in turn helps farmers prevent their operation from leaking budget, whether due to energy waste or risk prevention measures with large error margins. Through a consolidated data and controls platform, these benefits can be applied to their maximum potential for both indoor and outdoor farming.

Microclimates is excited to see what comes next with Hurst Greenery and Benchmark Labs, and continue exploring the possible versatilities of predictive data to support farmers in their journey to automation.