Case Study

Precision Monitoring Optimizes Bell Pepper Production

Company
Plant Lighting B.V.

Industry
Agricultural technology and protected crop cultivation

Products
Exergen AutoSmart AGRI infrared temperature sensors

The Internet of Agricultural Things promises to revolutionize food production through sensor networks and data-driven decision making. Plant Lighting, a Netherlands-based innovator in protected crop cultivation, launched a research program to optimize bell pepper growth by monitoring plant temperature with unprecedented precision. Using Exergen AutoSmart AGRI sensors from CleverIR, the company developed methods to calculate Vapor Pressure Deficit and adjust greenhouse conditions in real time, enabling more efficient resource use and higher yields.

Challenges

Plant development is regulated by plant temperature, not ambient greenhouse temperature. Optimizing growing conditions requires calculating Vapor Pressure Deficit, which depends on measuring the temperature difference between leaf surfaces and surrounding air with extreme precision. Traditional contact probes prove unreliable, measuring only tiny spots that may not represent average leaf temperature. They are also difficult to position securely on moving leaves. Even small temperature variations of just tenths of a degree have major consequences for VPD calculations and climate control decisions.

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Plant Lighting

CLEVER IR

Solutions

Plant Lighting selected the Exergen AutoSmart AGRI sensor, specifically calibrated for leaf temperature measurement. The sensor mounts on a flexible gooseneck for easy positioning toward plant leaves, even as they move. A Teflon housing provides environmental protection and stability, while an integrated clamp enables secure mounting. The sensor's field of view captures average leaf temperature rather than a single point. With 0.1°C resolution, it detects minute temperature changes essential for accurate VPD calculations, with analog output for cloud-based monitoring.

Benefits

The AutoSmart AGRI sensor enables precision agriculture at a practical level for commercial greenhouse operations. Its specialized calibration for leaf surfaces eliminates measurement errors common with general-purpose sensors. The sensor requires no recalibration, dramatically reducing maintenance costs and ensuring consistent performance over years. Unparalleled 0.1°C resolution captures tiny temperature variations that drive VPD calculations and climate decisions. The easy-to-position gooseneck and secure mounting allow quick deployment across multiple growing zones, while analog output integrates seamlessly with existing monitoring infrastructure.

"Temperature affects the speed at which plants develop. Measuring plant temperature with 0.1°C precision enables optimization of growing conditions for maximum yield."

Results

Plant Lighting successfully demonstrated that precise leaf temperature monitoring enables optimization of bell pepper growing conditions through real-time VPD calculations. By measuring actual plant temperature rather than relying on ambient air readings, operators can make informed decisions about heating, cooling, and irrigation timing. The research established monitoring protocols and best practices that greenhouse operators can implement immediately. This work advances precision farming and sustainable food production, demonstrating how sensor technology helps feed a growing global population more efficiently.

Conclusion

Plant Lighting's research with CleverIR sensors demonstrates how precision temperature monitoring transforms greenhouse crop production. The AutoSmart AGRI sensor solved critical measurement challenges that defeated conventional approaches, enabling accurate VPD calculations essential for climate optimization. This technology represents a vital step toward smart farming and sustainable food production at scale. As global population approaches 9.6 billion by 2050, innovations like precision temperature monitoring will be essential for producing food efficiently and sustainably in commercial greenhouse operations worldwide.

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