



Controlled Agricultural Manufacturing Systems

In the next decade, plants will become the major source for new pharmaceuticals, industrial proteins, vaccines and alternative energy sources. By 2011, plant-derived drugs alone will grow into a \$26 billion market, treating diseases such as cancer, asthma and chronic pain. But strains on biosecurity and product development threaten to reduce the full potential for plant-based products. A true bio-based economy requires new methods for research and production – methods that provide a safe and consistent growing environment to reduce development risks, while pushing the limits of traditional plant yields with a more productive and cost-effective system.

PLANET's Controlled Agricultural Manufacturing (CAM) Systems provide the security, flexibility, and targeted growth parameters necessary for high-value plant production by enabling the ability to:

- Grow your protein modified plant with environmental variables tailored specifically for its high yield.
- Provide each plant with its optimized photoperiod, up to 24 hours a day, 365 days a year.
- Cultivate your crop in any climate, in any economic area of the world, at nearly any scale of production with productivity orders of magnitude greater than field crops.

“We see controlled environment agricultural as the future... reducing the dependence on open field agriculture and providing a higher-dollar crop”

Prof. Gene Giacomelli
University of Arizona, Director Controlled Environment Agricultural Center

Superior closed environment systems and facilities from PLANET include:

- Solid state lighting systems with reduced power consumption and nearly negligible heat output to the plants
- Complete biosecure containment facilities
- Automatic controlled environment conditions optimized for each bio-product
- Energy control and management software systems
- Water management and recycling systems
- Integration of extensive process, quality and reliability tools



High Intensity LED Lighting

Technical Capabilities

Controlled environments sustain production with quality-controlled methods suitable for FDA and ISO approval without environmental vulnerability or liability. With unrivaled energy efficiency, biosecurity and high protein yield potential, PLANET's agricultural manufacturing systems are perfect for plant research, plant-made pharmaceuticals (PMP) and plant-made industrial protein (PMIP) production. They offer the invaluable combination of tailored facilities with environmental control expertise for faster, higher yield production of plant biomass. PLANET can also provide partnered support for biomass processing and extraction.

PLANET LLC's controlled agricultural manufacturing systems are based on 20 years of expertise developed as a leader in controlled environments and LED lighting research for NASA. Now applied on a room-by-room scale, large and small-scale production systems can be customized for each bio-product, including:

- Solid-state lighting
- Temperature control
- Humidity control
- Atmospheric composition control
 - CO₂ concentration
 - Ethylene removal
 - Contaminant removal (VOCs)
- Automated process monitoring, data acquisition, diagnostics and alerts
- Nutrient delivery
- Growth production protocols
- Biomass collection and separation
- Waste processing
- Reliability assessment and operational management practices
- Water conservation
- Energy monitoring, control, and conservation

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