

Plant Environmental Physiology Laboratory, China Agricultural University

About the Laboratory

The Plant Environmental Physiology Laboratory (PEPL) at China Agricultural University was established by Prof. Dongxian He who returned from Japan in 2002. The research topics include plant factory technology, greenhouse design and environment control, information monitoring instruments, LED lighting control and plant environmental physiology. The research projects are mainly funded by the Ministry of Science and Technology, the Ministry of Agriculture and Rural Affairs, and the National Natural Science Foundation of China. The laboratory has collaborated closely with domestic and international colleagues in both academia and industry. More than 30 graduate students have been trained who are actively working in universities and industry. "Preciseness, Persistence, Openness, and Innovation" is the motto of the laboratory. The love of science and the exploration of nature are the driving force of scientific research forever.



About the PEPL team



Prof. Dongxian He
Plant Environmental Physiology



Assoc. Prof. Zongmin Liang
Greenhouse Design



Assoc. Prof. Qing Zhou
Greenhouse Cultivation



Assoc. Prof. Yuxin Wang
Environment Control



Assoc. Prof. Xiaoyan Yuan
Energy Saving Control



Dr. Fang Ji
Bio-environment Engineering



Dr. Liang Zheng
Plant Physiology



Assistant Weifen Du
Plant Propagation



Senior Eng. Jian Deng
Industrialization Promotion



Technician Aiguo Zhang
Mechanical Operation



Technician Weitao Du
Structure Installation

Innovative Achievements

1) PEPL established the physiological experimental method for CAM plants such as medicinal *Dendrobium* and orchid plants via measuring gas exchange, electron transfer, and stomatal movement.

2) PEPL developed LED plant factory technology including LED lighting for plant growth, web-server-embedded environmental control system, and nutrient solution dynamic control system for industrial application.

3) PEPL developed the zero concentration difference of CO₂ enrichment method, energy-saving-type heat-pump heating system, and soil disinfection practical equipment for improving greenhouse productivity.



Research Projects of Plant Environmental Physiology Laboratory, China Agricultural University

Key Technology Development and Application Demonstration of LED Lighting for Seedling Production Supported by National Key R&D Project on Strategic Advanced Electronic Materials (2017-2020)

In order to meet urgent demand for high quality seedling production in large scale, plant response mechanism of LED lighting and its control technology was targeted for vegetable transplanting and virus-free strawberry seedling production. The special LED light sources for closed transplant factory and LED supplement lamps in greenhouse were designed and developed for LED lighting control and LED-based transplanting factory will be tried for grafted seedling production.



Fertilizer-integrated Irrigation Control Technology and Equipment Development for Greenhouse Horticultural Production Supported by National Key R&D Project on Reducing Fertilizer and Pesticides (2017-2020)

The precision and reliability of pH/EC monitoring is an important guarantee in fertilizer-integrated irrigation equipment. Because of technical restriction of ionic monitoring, pH/EC sensors with high precision, long life and low cost were screened by correction algorithm and maintenance measures of the sensors, and dual pH/EC collector was developed for life evolution and reliability guarantee. It provides technical support for the fertilizer-integrated irrigation equipment development based on the pH/EC feedback control.

Scientist Project of Intelligent Management and Control in National Technical System of Traditional Chinese Medicine Industry Supported by China Agriculture Research System (CARS-21) from 2019

In order to provide technical support for Chinese medicinal plant production with high quality, intelligent environmental control and mechanized operation technology will be developed for achieving large-scale and standard production with high value-added plants. The photosynthesis pathway control for *Dendrobium* plants, hydroponic cultivation technology for *Hypericum perforatum*, seedling greenhouse production for *Salvia miltiorrhiza* and *Scutellaria baicalensis* were focused and demonstrated for industrialization.



Prof. Dongxian He

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