



VERTICLE
FARMING



ABOUT

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China



Food, land, environment and life quality is constrained by each other, and it is difficult to develop them harmoniously. For example, to increase grain output, we have to expand the cultivated land and use a lot of chemical fertilizers and pesticides, resulting in environmental degradation, resource reduction and serious food security problems.

What is an artificial light plant factory?

Artificial light plant factory is based on soilless cultivation technology, by photobiology, mineral nutrition, and climate environment control technology and other modern technology means to optimize the environment of the growth of plants. By these approaches, the plant growth process is not affected by the natural growing environment, realizing the industrialization of the plant's growth process and continuous high growth.



The features of vertical layered planting and controlled environment

- o Increase food production without expanding cultivated land and damaging the environment.
- o Insect-free, disease-free and pollution-free.
- o Plant growth process is not affected by natural climate, realizing continuous industrialized planting and planned planting according to demand.

Soilless cultivation

In the conventional planting method, soil can store mineral nutrients, hold water, keep the roots warm, and fixing the plants. Soilless culture, to use a utensil to fix the plants, and ensure the mineral nutrients, moisture, insulation and ventilation needed for plant growth by using environmental control techniques. Mineral elements are essential nutrients for plant growth which include carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, zinc, boron, molybdenum, nickel, chloride.

Cultivation without sunlight

Light is the necessary energy for plant growth. Sunlight is a full spectrum of light. Different wavelength spectra have different photosynthetic efficiency for plants, and not all of the spectral energies of sunlight are required by plants, therefore, different plants require different spectral wavelengths for photosynthetic efficiency. For example, the color of plants is green, indicating that plants do not absorb energy from the green spectrum of sunlight.

Cultivation without the natural environment

- o The optimum temperature for plants is 20–30°C.
- o The optimum humidity for plants is 60-90%.
- o The optimum carbon dioxide concentration for plants is 800-1000ppm;
- o Insect-free, disease-free and pollution-free.

Automatic planting equipment

Integral layered structure

The width length and height of each layered unit can be extended continuously. There are no aisles between shelves.

Closed environment

Set up a closed environment in the space where plants grow to separate people.

Automation

Plants can only be planted and harvested from the window set in the closed environment space, and the movement during the plant growth process on the shelf is all automated.



The features of automated planting system



Integral layered structure



Distributed layered structure

High-efficiency farming

The average efficiency is about 1.3 times higher than the ordinary technology planting method.

In ordinary technology, the shelves are arranged in a distributed manner, with aisles between the shelves, either manual or mechanical. The area of aisles is about one-third of the total area.

High in energy utilization efficiency

In ordinary technology, people and plants are in the same space, which requires large space volume and consumes large energy to control the factory.

High working efficiency

The movement in the growth process is fully automated, compared with ordinary technology, which requires manual or mechanical movement of plants on the shelf, it greatly decreases labor costs.

Automatic planting

The movement in the process of planting and environmental factors for plant growth is controlled by computers.

Scale cultivation

Layers of automation equipment can be built on many levels. For example, a plant factory covering 6,000 square meters can produce 100,000 square meters of cultivated area.



1. Cultivation method:

We apply a hydroponic immersion method to produce best.

2. Equipment specification parameters

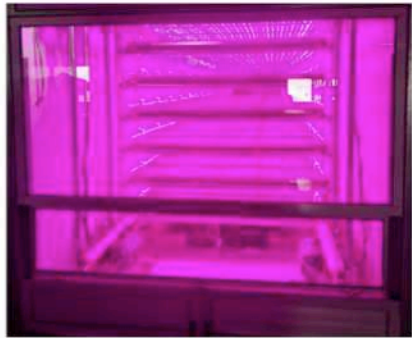
Specification of monolayer	width 2200 Width 1300
Length of equipment	$M \times 1300 + 2000$ (M is the number of length units)
Width of equipment	$P \times 2100 + 600$ (P is the number of width units)
Height of equipment	$H \times N + 1500$ (N is number of layers, H is height between layers, set as 250-500 according to different plants.
Cultivation area of monolayer unit	2.16 sqm
Distribution power	200W/ sqm of cultivated area

3. Environmental parameters

The movement cycle of lettuce	3 minutes
Growth cycle (12H of light)	40-50 days from sowing to harvest (seeding stage 20-35 days)
Variety of lettuce	Lvya、Ziya、Gelin、Lvluoma、Ziyan、Lvdié、Kuju、
Output	Around 2.5-4 kg/ sqm of cultivated area



Distributed layered structure



Automatic planting equipment (around 13.332 meters)



Automatic planting equipment 536 (M=5,P=3,N=6)



Automatic planting equipment 966 (M=9,P=6,N=6)

4. Lettuce planting parameters

Optical parameter	PPFD \geq 200 μ mol/m ² /s
	R/B=5-6 (can be specified by the customer)
Nutrient formulation	See the formula table
Temperature	20-30°C
Humidity	\geq 80%
Concentrations of carbon dioxide	800–1000ppm

The development of the plant cultivation





Vision

- ◆ Plant factory technology and biotechnology are the two major agricultural technologies of the future.
- ◆ With plant factories, cities will be surrounded by vegetation and forests, instead of vegetable fields.
- ◆ With plant factories, will a man need to look to the outer space?