

From Agriculture to Life Science:  
*Triple-Wideband LED Lighting Systems and  
Innovative Functional Plant Cultivation Techniques  
for Indoor Agriculture*

November 29, 2016



Nihon Advanced Agri Co. Ltd.

Web: [www.adv-agri.co.jp](http://www.adv-agri.co.jp)

Email: [info@adv-agri.co.jp](mailto:info@adv-agri.co.jp)

Phone: +81 77-588-6121



## Corporate Overview



## Advanced Lighting Technology



## Plant Factory Systems



## Health Food Business

# Corporate Overview



## Headquarter

617-1 Suehiro-cho  
Nagahama, Shiga  
Japan 〒526-0063  
Tel: +81 (749) 53-0101

## Yasu Office

457 Ichimiyake  
Yasu, Shiga  
Japan 〒520-2362  
Tel: +81 (77) 588-6121

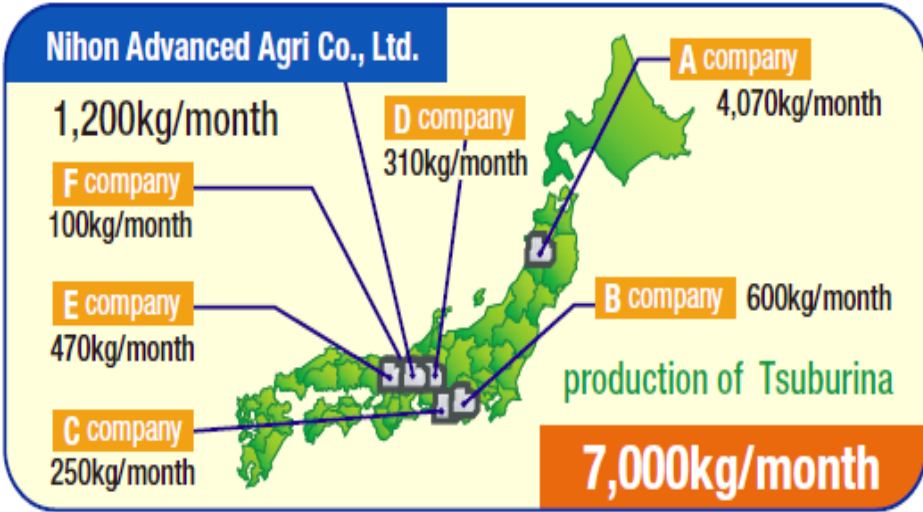
## History

Founded in 2006, Nihon Advanced Agri engaged in functional plant research with Nagashima Bio University and launched “mama’s farm” to sell branded ice plant “Tsuburina.” It first developed HEFL grow lights, followed by patented Triple-Wideband LED series that is marketed globally.

## Our Philosophy

Nihon Advanced Agri finds inspiration in discovering new technological advancements in agriculture. We seek out possibility in life sciences to create the next generation of whole food products to promote health and beauty.

# “Tsuburina” — Functional Ice Plant Vegetable





## Corporate Overview



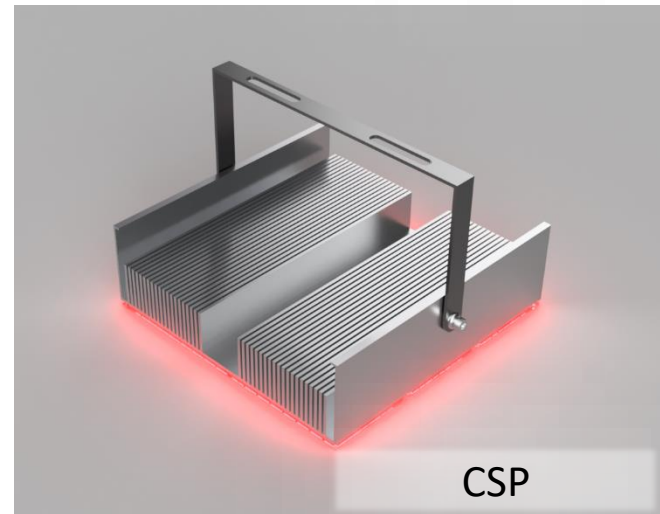
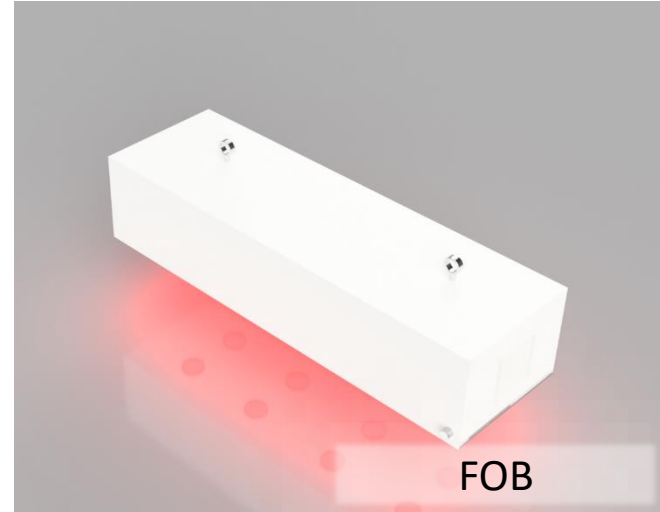
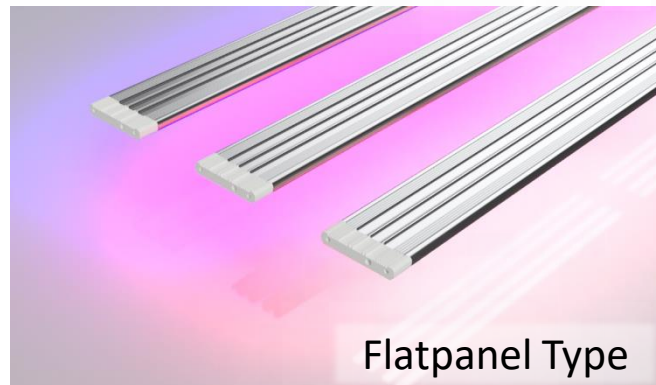
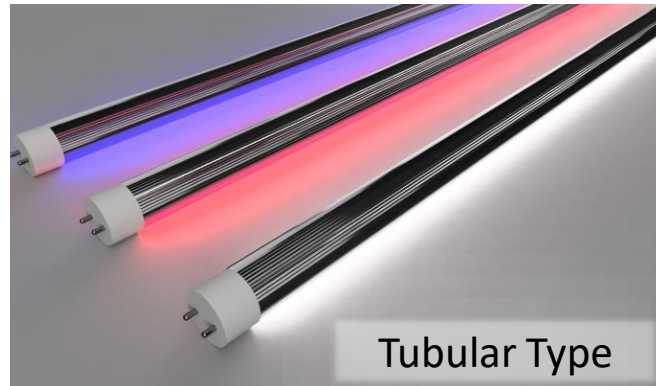
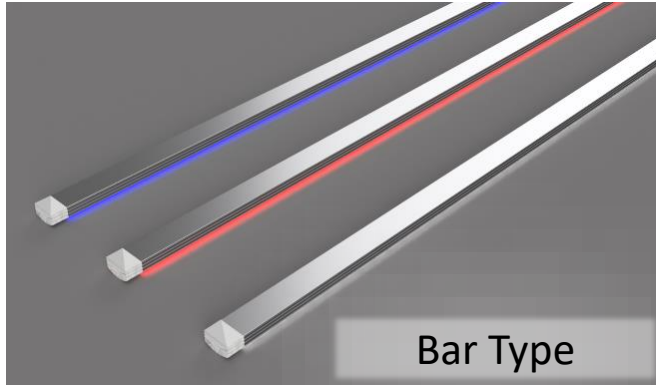
## Advanced Lighting Technology



## Plant Factory Systems



## Health Food Business





## CONVENTIONAL LED

### Conventional Multi-Chip Architecture

Blue Diode + Green Diode + Red Diode



### Conventional White LED Architecture

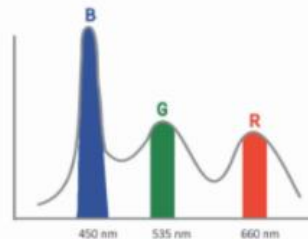
Blue Diode + Yellow Phosphor



## NEW TRIPLE-BAND LED

### New Triple-Band LED Architecture

Blue Diode + Green & Red Phosphors



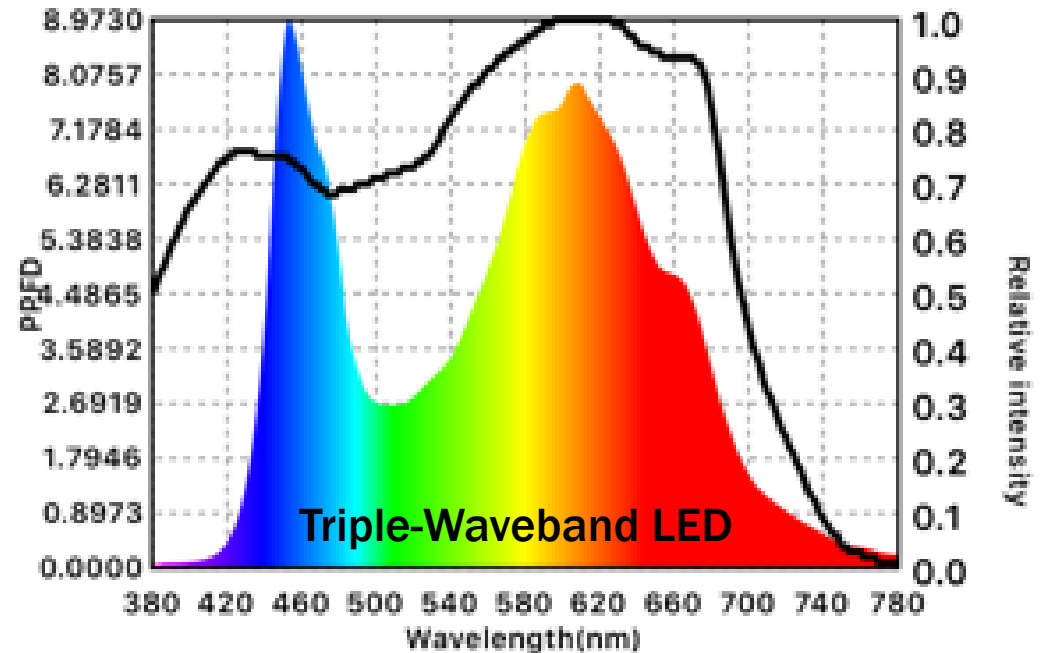
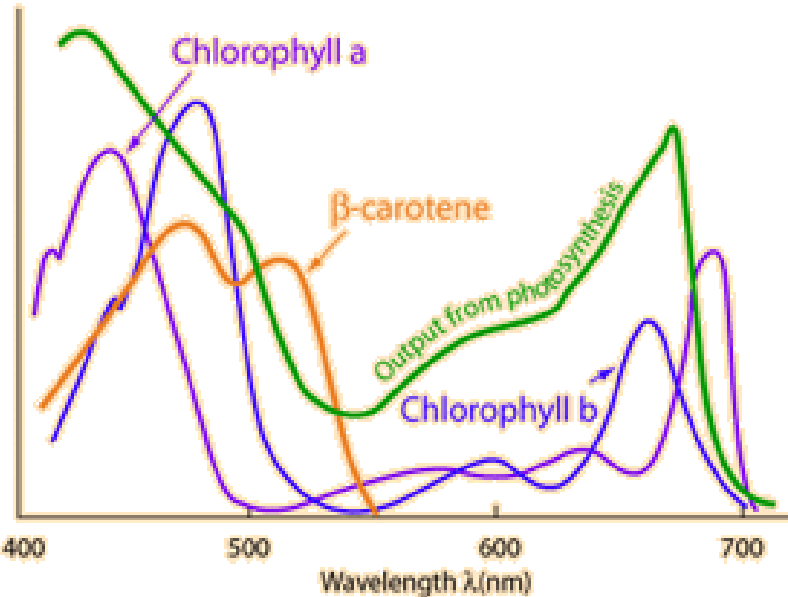
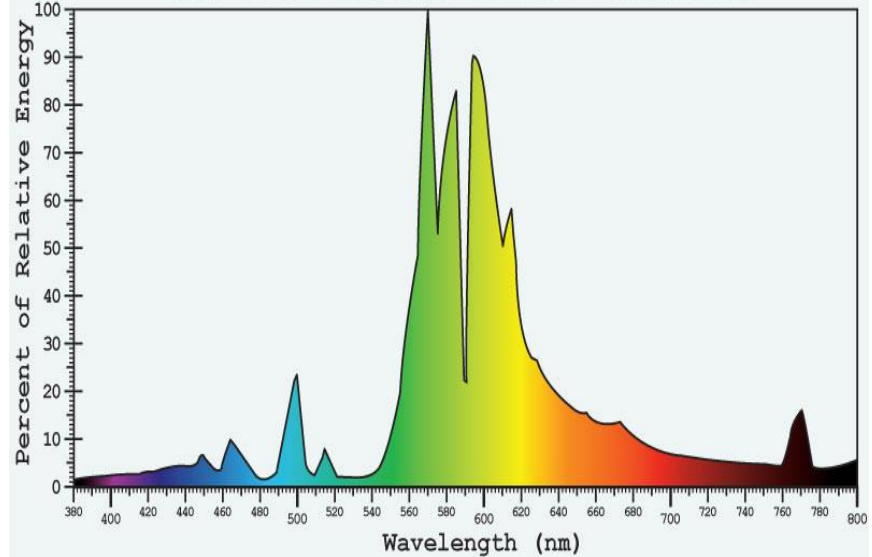
**Triple-Band LED** series is our energy-saving horticultural LED lights

- Built on a novel single-chip design architecture
- Emits full-spectrum red, green, blue (RGB) bandwidths
- White light for easy working environment
- Promotes photosynthesis and healthy vegetation
- Ideal for multi-layered vertical farming, seedling propagation, and tissue culturing
- Energy efficient and low waste heat

# Light Spectrum Comparison; HPS vs. LED



HPS (High Pressure Sodium) 1000w Bulb



# LED Lighting Efficacy

Nihon Adv Agri  
Triple-WB LED

Manufacturer A  
Red + Blue LED

Manufacturer B  
Red + Blue LED

Hf Fluorescent

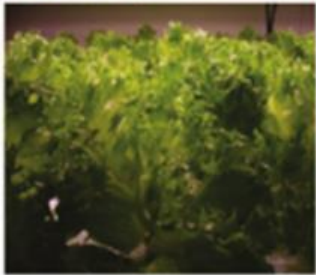
Day 24



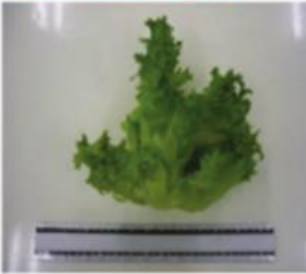
Day 30



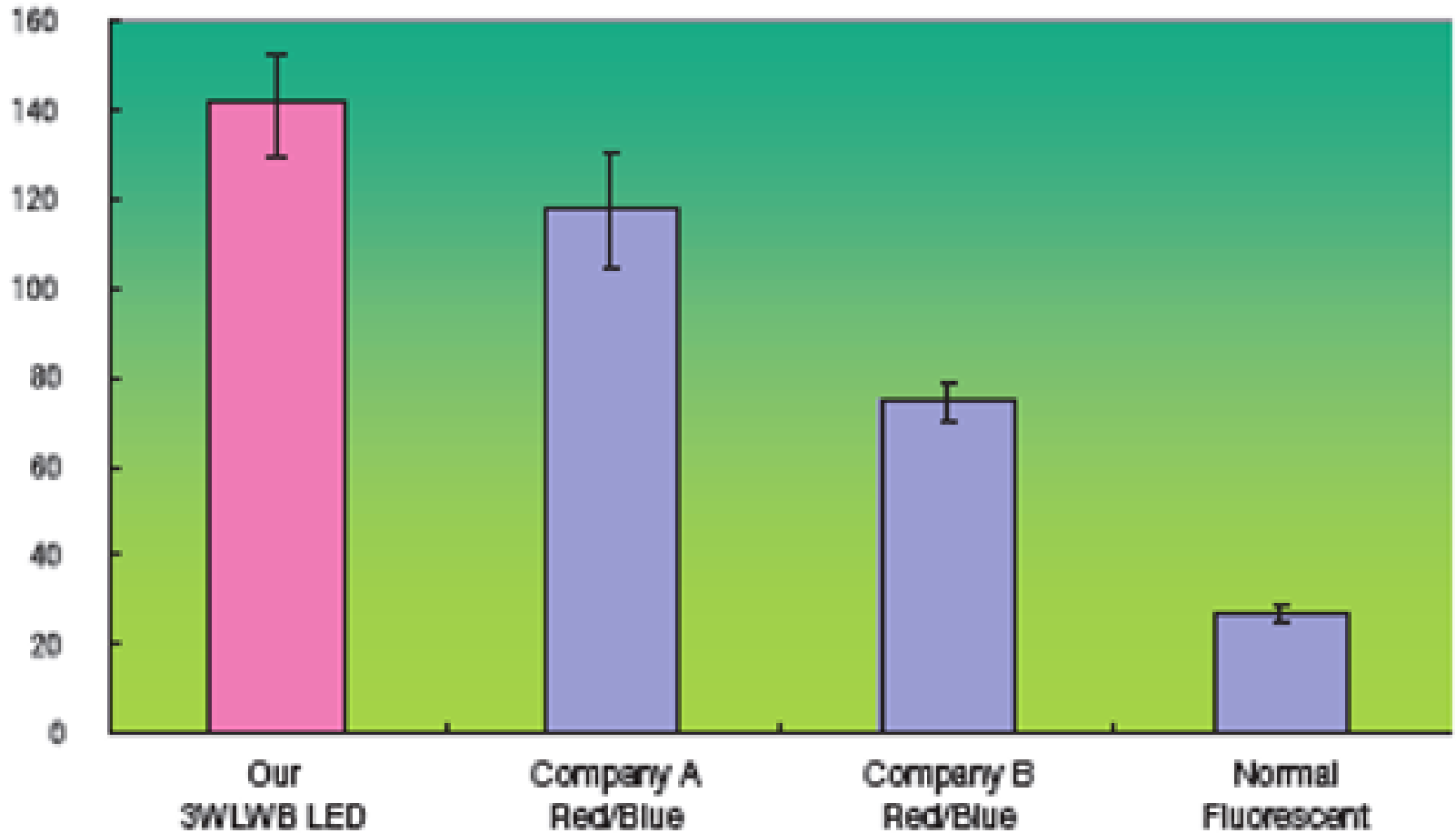
Day 35



Day 39  
Harvest



# Fresh Weight Yield Comparison



**Our Red-White LED** produces up to 5 times bigger crops

Green Kale ('Dwarf Blue Curled')

PPFD at  $200 \mu\text{mol m}^{-2} \text{s}^{-1}$

Water only with no nutrients

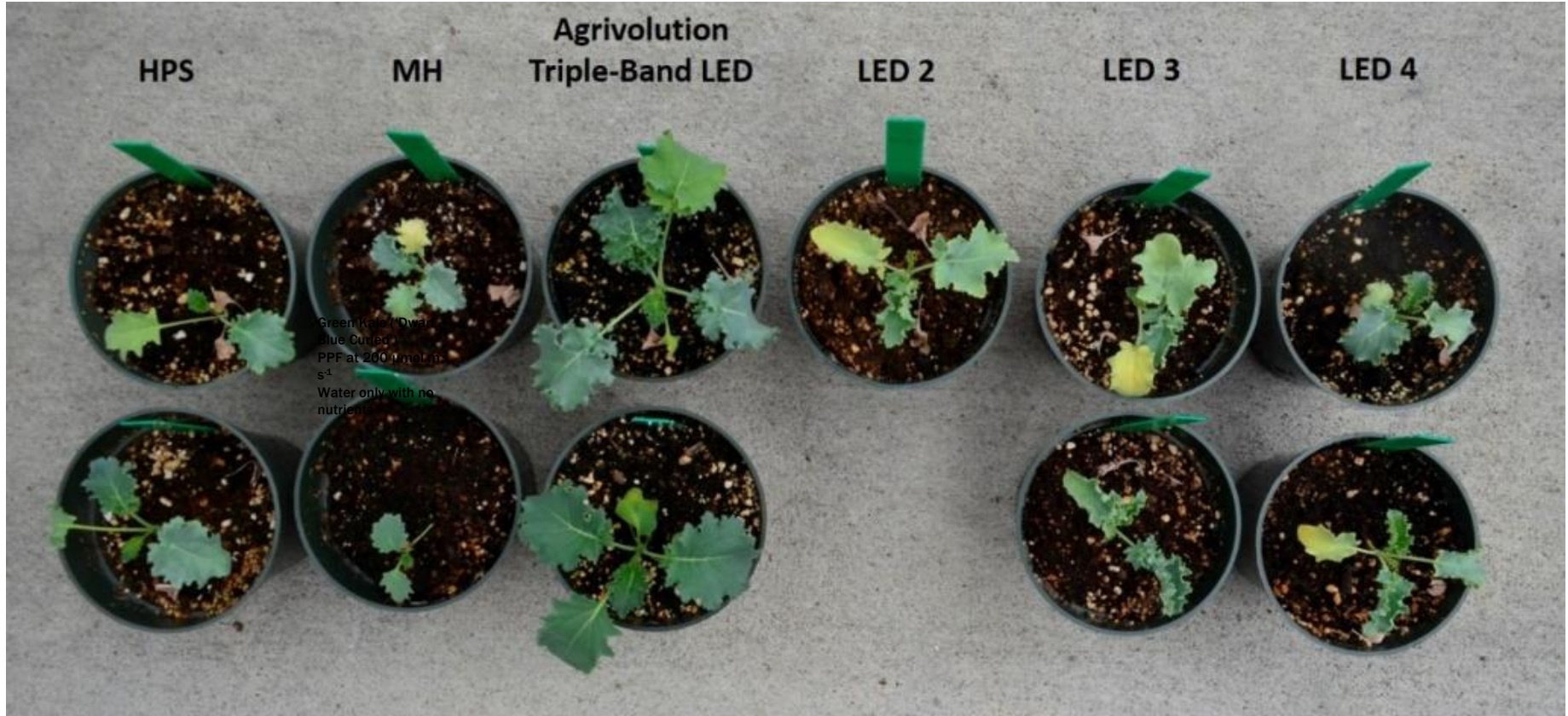


Photo courtesy of West Virginia University



Ice Plant



Pourpier



Green Leaf Lettuce



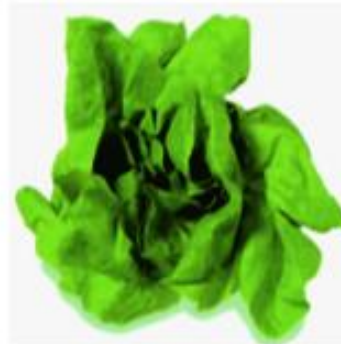
Romaine Lettuce



Frisly Lettuce



Endive



Bibb Lettuce



Celery



Baby Leaf



Basil



Watercress



Arugula

Customer A



Customer B







## Corporate Overview



## Advanced Lighting Technology



## Plant Factory Systems

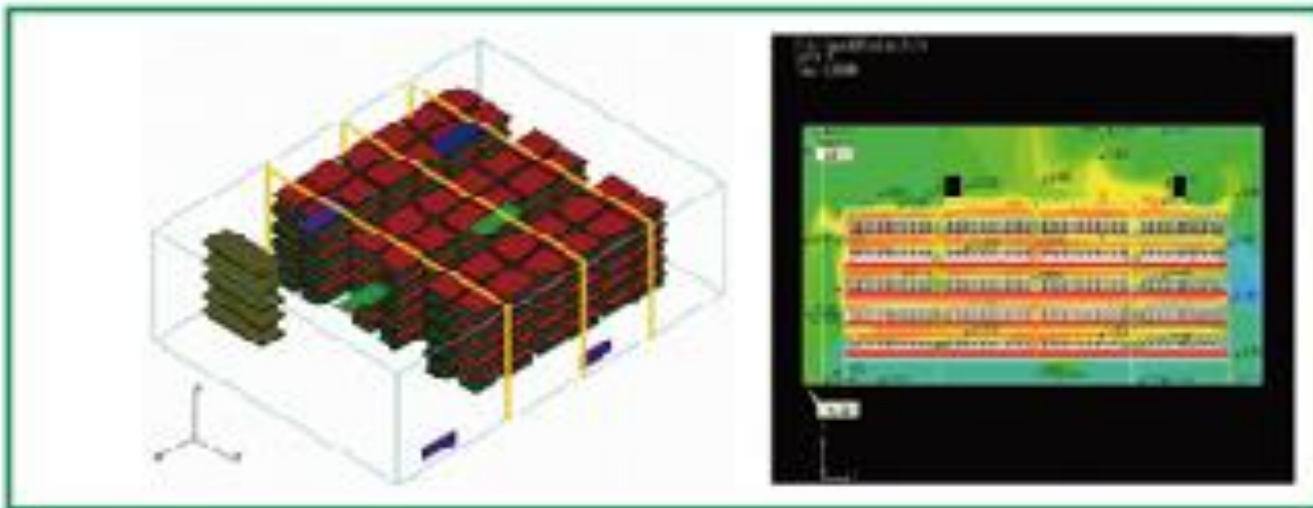


## Health Food Business

Plant factory provides multitude of benefits including steady, year round production.

Based on 10 years of experience, we lead the indoor agriculture industry and offer customized engineering and services including:

- High density, high output plant factory designing
- Nutrient management and irrigation control
- Crop-based lighting selection and management
- Air flow system design and CO<sub>2</sub> enrichment
- Production stability through automation and environmental control





## Example Incubation Setup

Room dimensions	11,500 mm x 10,600 mm
System count	24 racks
Daily Output	3,072 plugs
Irrigation	Fully automatic
Crop	Any
Lighting	Triple-Band LEDs

- Suitable for plug propagation of all types
- Triple-Waveband LEDs ensures healthy plug growth
- Proprietary environmental controller maintains uniform temperature and humidity
- Automated pH balanced nutrient delivery and irrigation for strong root growth

# 40 ft Hi-Cube Container Cultivator System



## Cultivator Specifications

Exterior Dimensions	L 12,192 × W 2,438 × H 2,896 [mm]
Interior Dimensions	L 11,554 × W 2,286 × H 2,521 [mm]
Aisle Width	880 [mm]
Power (Maximum)	12 kW (110V, Single-Phase)
System Count	14 racks (max.)



## System Specifications

System Dimensions	L 1,300 x D 738 x H 2,400 [mm]
System Level	Up to 5 tiers
LEDs	280 units
Productivity	Lettuce: 100/day Ice plant: 50/day

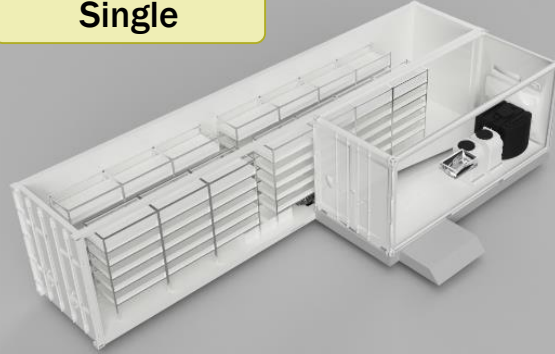


- Modular interconnectivity
- Air conditioning and filtration system
- CO<sub>2</sub> monitoring and enrichment
- Balanced nutrient dosing system
- Environmental remote control system

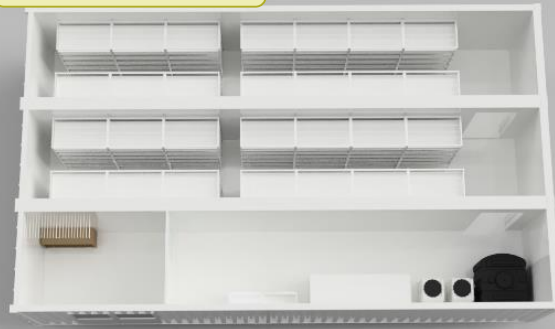
## Advantages of Container Cultivators

- Superior insulation
- Low cost entry without need of a building
- Deployable in any geographical location
- Fail-safe established HVAC technology
- Flexible and customizable configuration

Single



3 Cultivators



5 Cultivators





## Corporate Overview



## Advanced Lighting Technology



## Plant Factory Systems

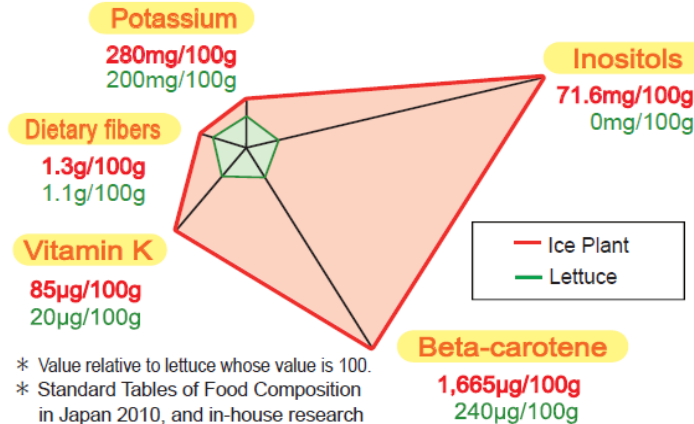


## Health Food Business

## Ice plant (*Mesembryanthemum crystallinum*)



### Nutritional Composition



### Inositol Group

- The inositol group is a type of B-complex vitamin that promotes cell growth
- Myo-inositol functions to improve the flow of lipids and prevent fat accumulation
- Pinitol is effective in controlling blood sugar

### Beta-carotene

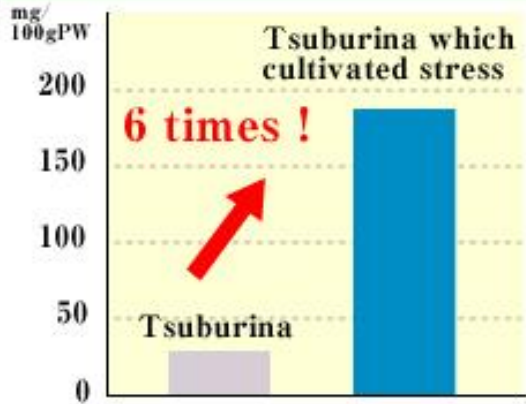
- High anti-oxidizing effect that aides in anti-aging and fatigue recovery
- Effective in cancer prevention

### Vitamin K

- Essential for calcium deposition in bones

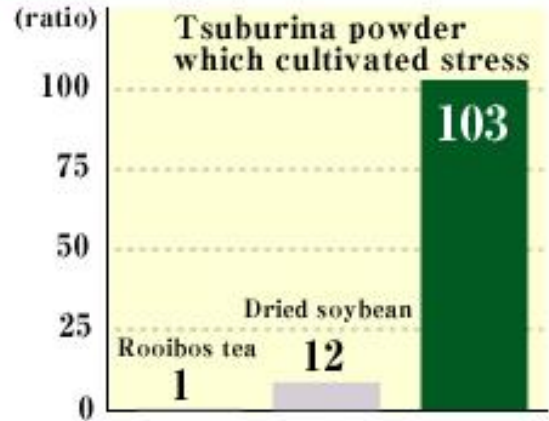


## Nourishment comparison

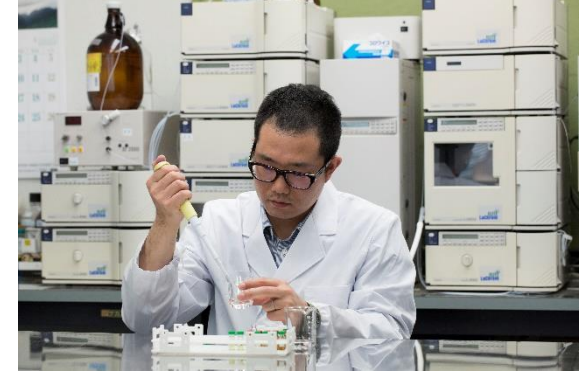
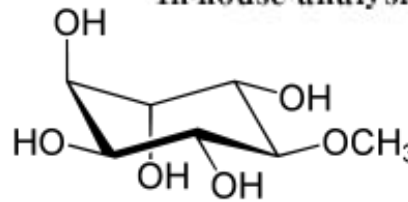


In-house analysis (Relativity value)

## D-pinitol content ratio in dried food



In-house analysis



## Monde Selection 4 times Gold Medal winner



From Agriculture to Life Science:  
*Triple-Wideband LED Lighting Systems and  
Innovative Functional Plant Cultivation Techniques  
for Indoor Agriculture*



Nihon Advanced Agri Co. Ltd.

Web: [www.adv-agri.co.jp](http://www.adv-agri.co.jp)

Email: [info@adv-agri.co.jp](mailto:info@adv-agri.co.jp)

Phone: +81 77-588-6121