

At the reclaimed land of Kasaoka Bay, Okayama Prefecture  
**World-leading vegetable horticulture business  
with biomass power cogeneration**



**SARA**

Smart Agribusiness Research & Alliance

# Abundant solar radiation by "Okayama of the Sunny Country"

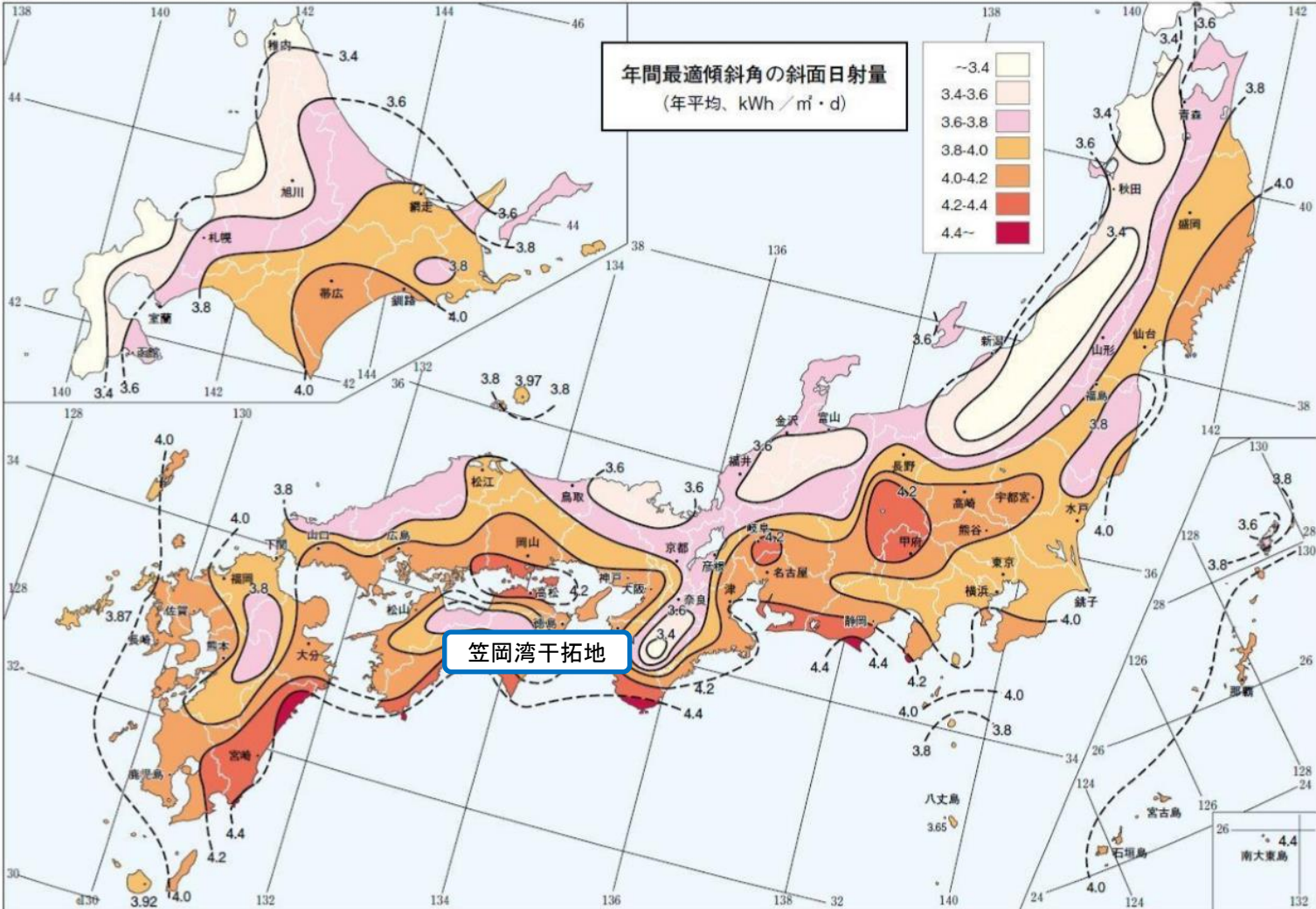


図7 年間最適傾斜角の斜面日射量。数値の単位はキロワット時/平方メートル・日。出典：NEDO

Kasaoka, Okayama and Hokuto, Yamanashi are best climate location for horticulture business in Japan

# Smart horticulture complex utilizing biomass energy



## Reclaimed Land, Kasaoka Bay

Project cost : 30 billion yen

Construction : 1966-1990

Reclaimed area 1,191ha

## SARA first project

Greenhouse area : 20ha

Possible expansion

## Related infrastructure

Agricultural Water : 90,000 m<sup>3</sup>/day

Industrial Water : 50,000 m<sup>3</sup>/day

Grid connection : 22, 000V

Access to vegetable shipping

Sanyo express way

National road Route 2 Bypass

Port of New-Kasaoka

## 【 Climate 】

Annual average temperature 15 °C

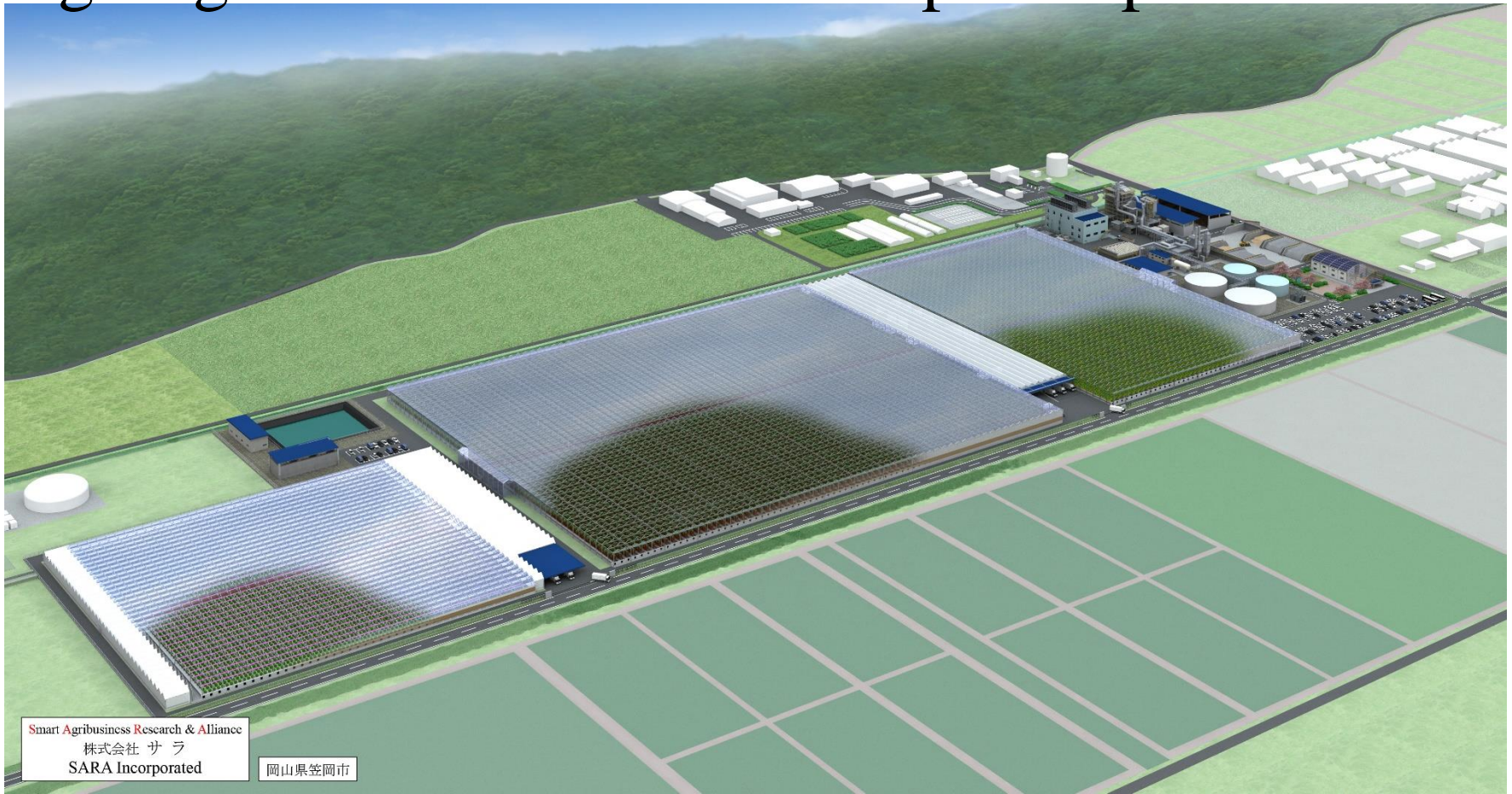
Annual precipitation 1, 100mm

Daylight hours 2,100 hours or more

Maximum average wind speed 6m/s



# Largest greenhouse and biomass power plant in Asia



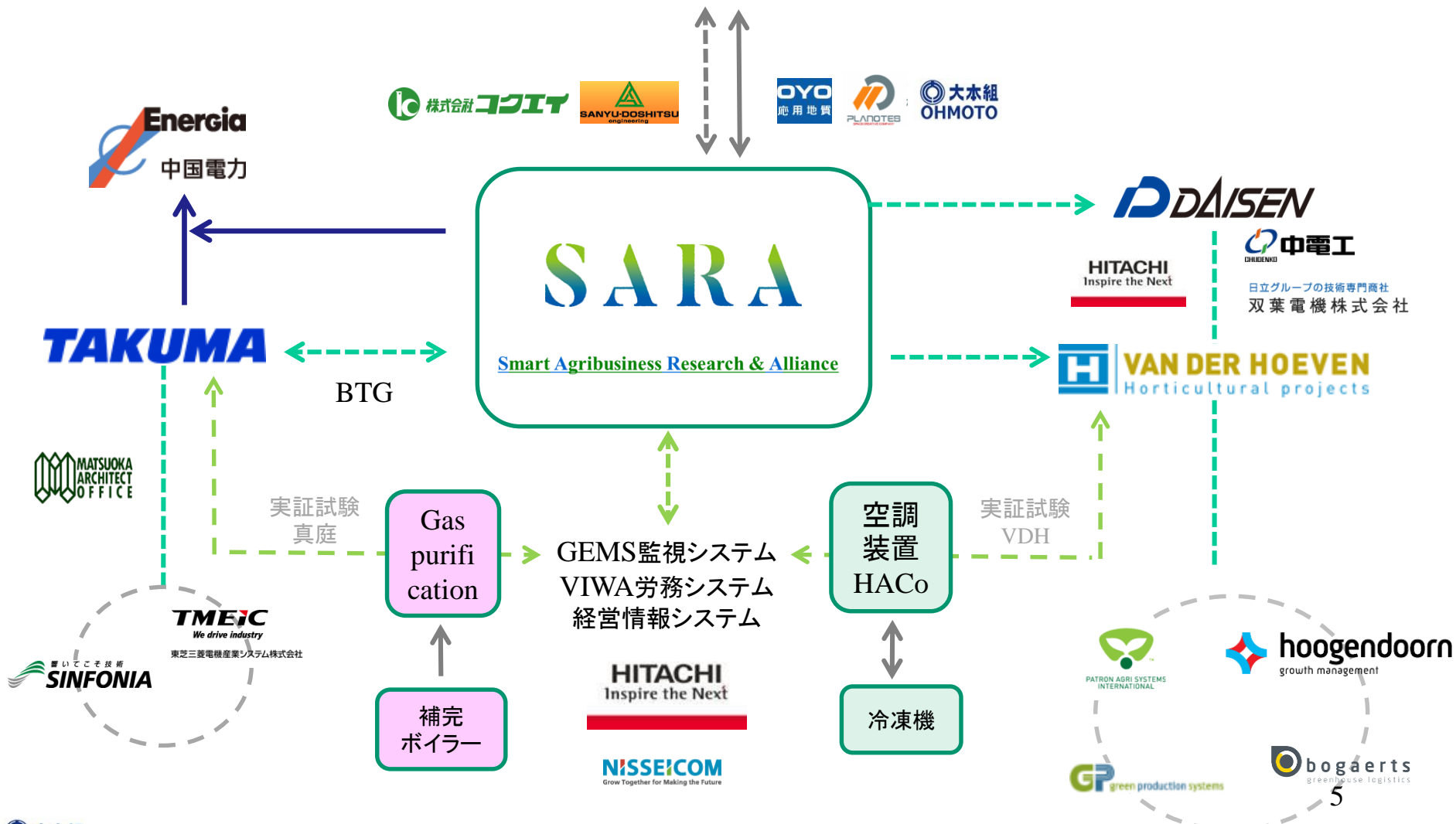
## Semi-closed glass house (13.0 ha)

Lettuce 2.5 ha (165mx151mx8m)  
Tomato 6.0 ha (265mx225mx8m)  
Paprika 3.4 ha (151mx225mx8m)  
Shipping 1.0 ha (0.68 ha + 0.27 ha)

## Biomass power generation (10MW)

Fuel consumption 80,000 ton /year  
Power generation: 80 million kwh/year  
Gas purification 14, 000N m<sup>3</sup>/hour  
Air-Conditioning tank 6,700 m<sup>3</sup> total<sup>4</sup>

# Key international & domestic partners build SARA





# Difficult to build on soft reclaimed land like Holland

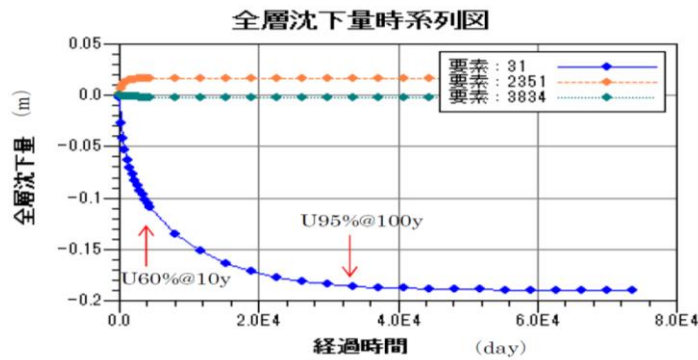
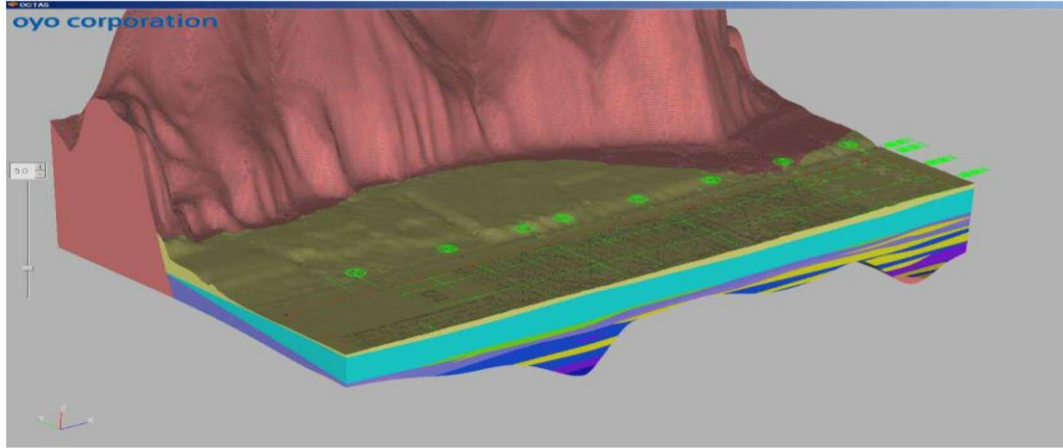


図 7-22 Case01 の代表地点の沈下量の経時変化



Greenhouse post pile	: 3,200 (12 ~ 25m)
Under ground pipe pits	: 5,000 (2 ~ 4m)
Biomass power plant piles	: 300 (20 ~ 35m)
Cement Piles	: 600 (12 ~ 13m)

# A combination of world-leading technologies



**FIT**

**State-of-the-art  
high efficiency  
Biomass Power Plant**

**Agricultural use**

11ha semi-closed greenhouse  
Complex control of humidity, carbon dioxide,  
airflow, fertilizer, etc.  
**High-yield, low-cost, high-quality vegetables**

10MW biomass power plant  
Supply of heat, cold, carbon  
dioxide and electricity  
**Biomass Tri-generation (BTG)**

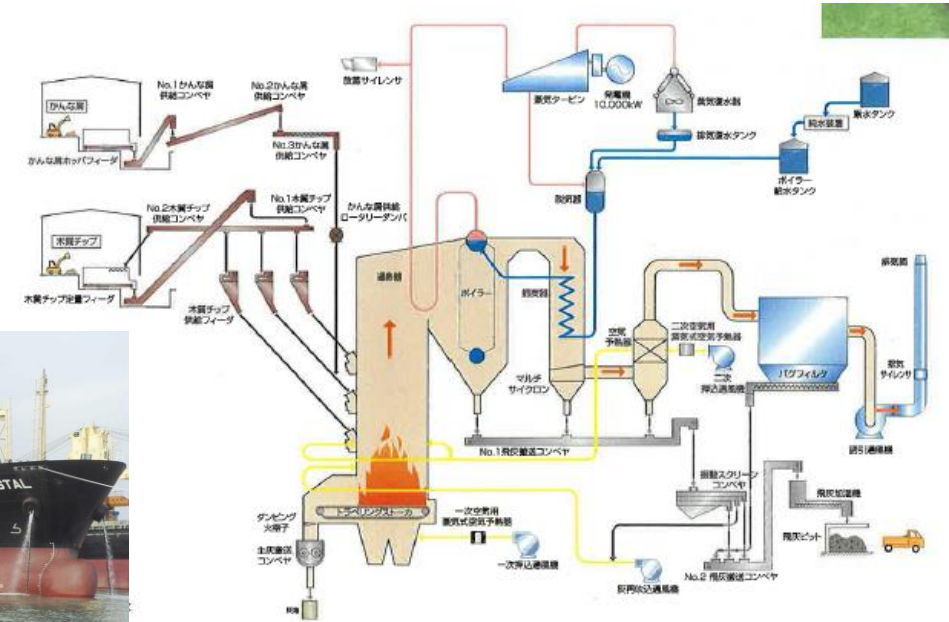


# Stable procurement of biomass power plant fuels

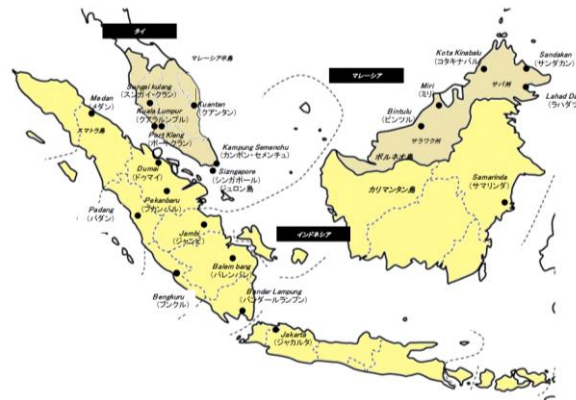
## Wood Chip from Vietnam



## Domestic wood chip

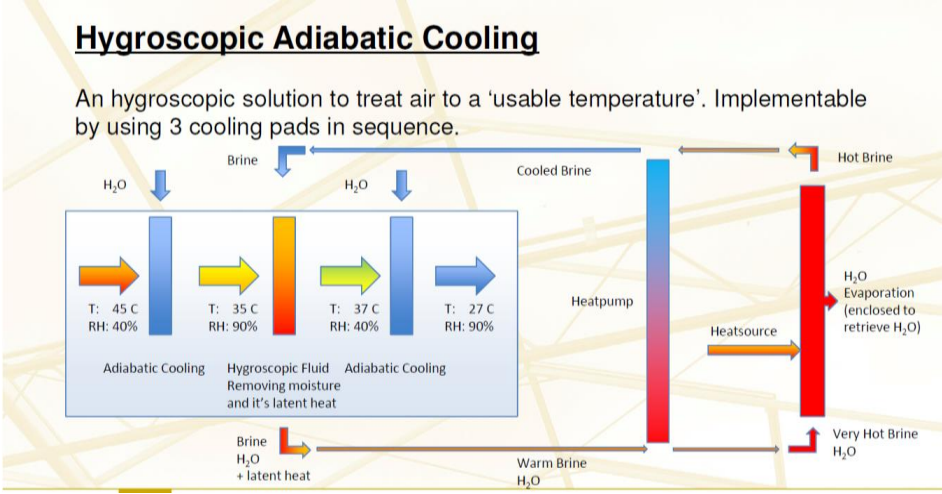
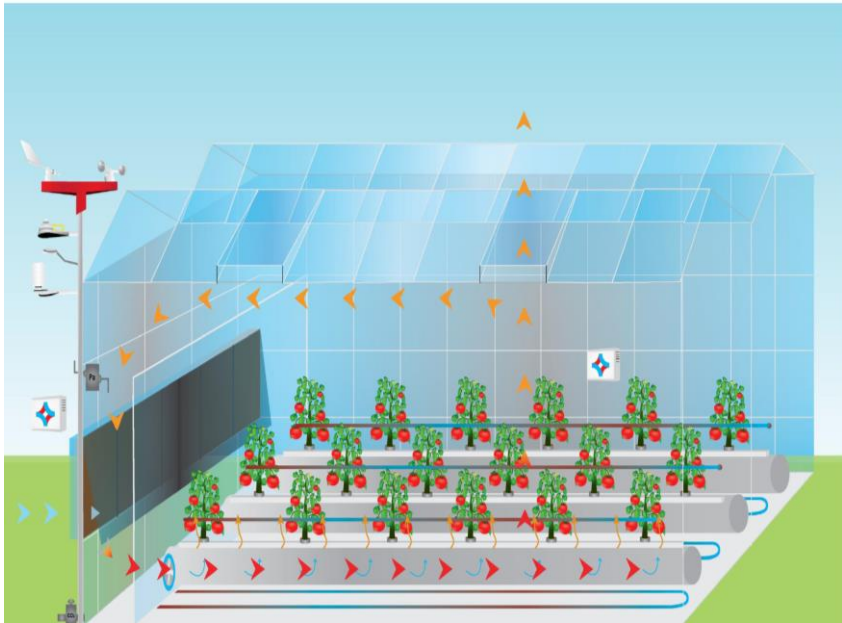


## Palm kernel shells Malaysia and Indonesia





# Complex control of temp., humid., CO2, airflow, and fertilizer



The world's first greenhouse air conditioning  
Hygroscopic adiabatic cooling (HACo)

SARA acquires Asian license rights





# Vegetable cultivation in semi-closed greenhouse



Tomato  
107mX298beds X2  $\doteq$  64Km  
20 million plants



Coco organic  
Grow bags

Paprika  
107mX336 beds  $\doteq$  36Km  
24 million stems



Peat moss  
Organic grow pots

Lettuce  
11.6mX11,800G  $\doteq$  136km  
78 million plants





# Automated logistics carts and sorting/packaging line



Real-time, wireless communication



# Clean vegetable by IPM (Integrated pest management)



灰色かび病



うどんこ病



褐色根腐病



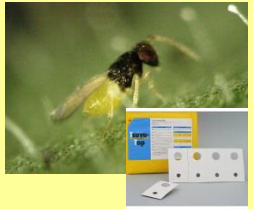
ハモグリバエ



コナジラミ類

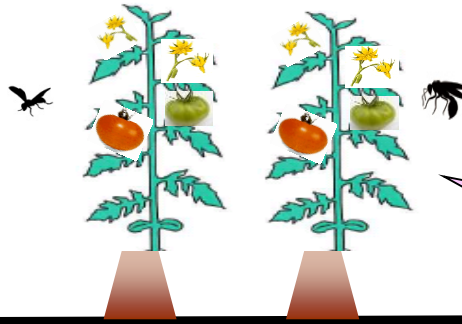


Natural enemy



遮光/保温カーテン

防蛾灯



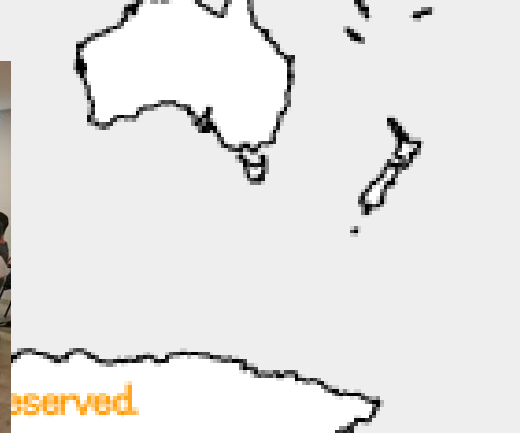
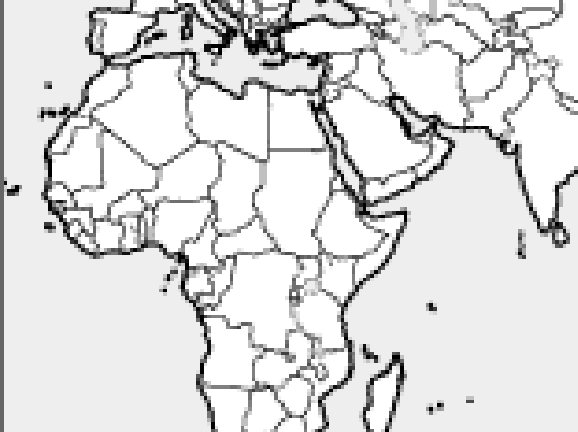
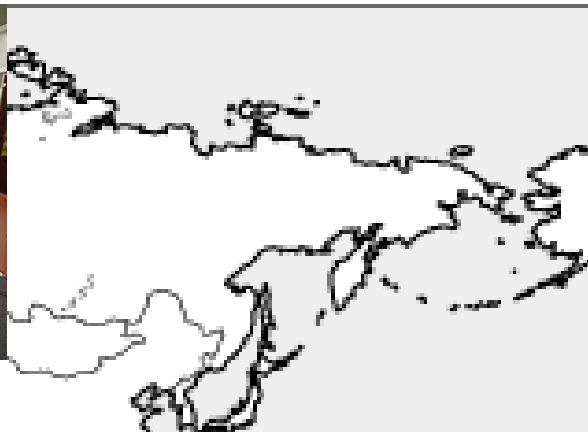
Bumble bee



Pesticide residue free



# Global conference by world leading business partners



# Greenhouse and power plant will be completed Dec., 2018



2019 April , lettuce



May, tomatoes



June, paprika



2019 January, connect grid  
April. FIT start





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