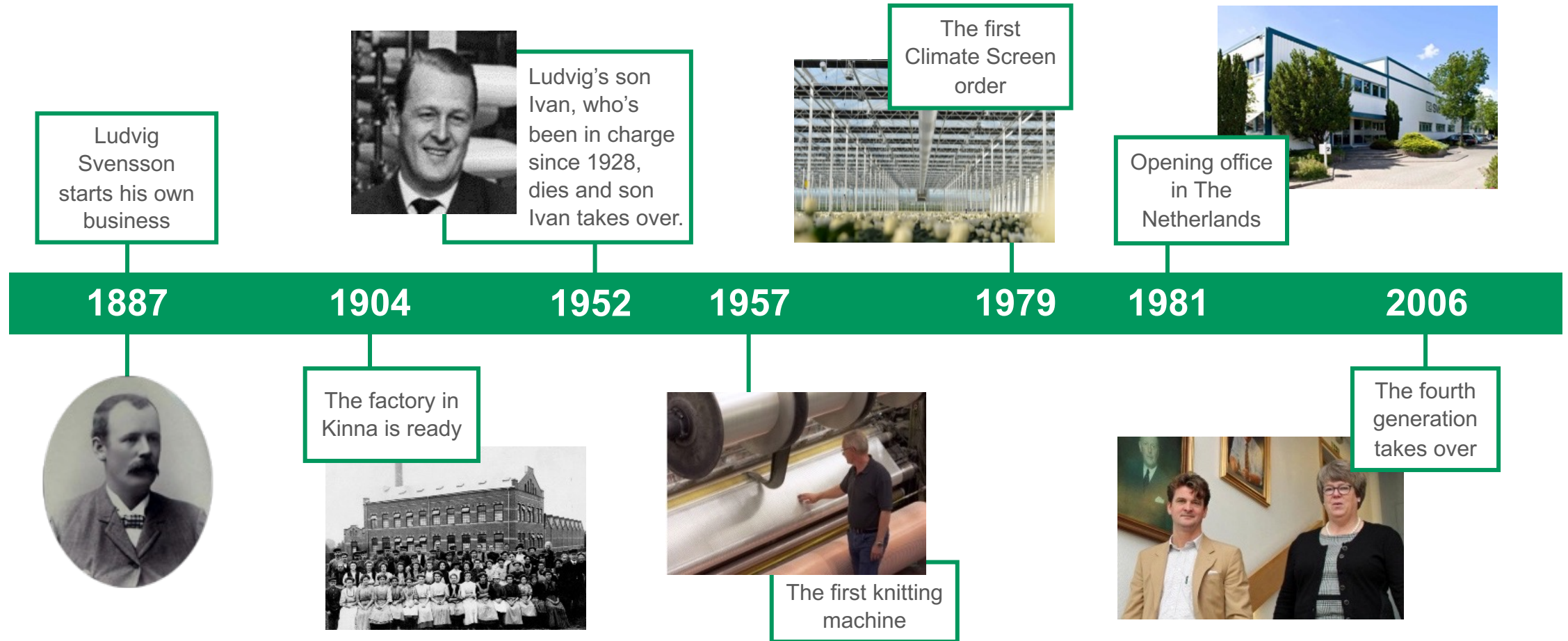




# Energiteknologi til væksthushbranchen

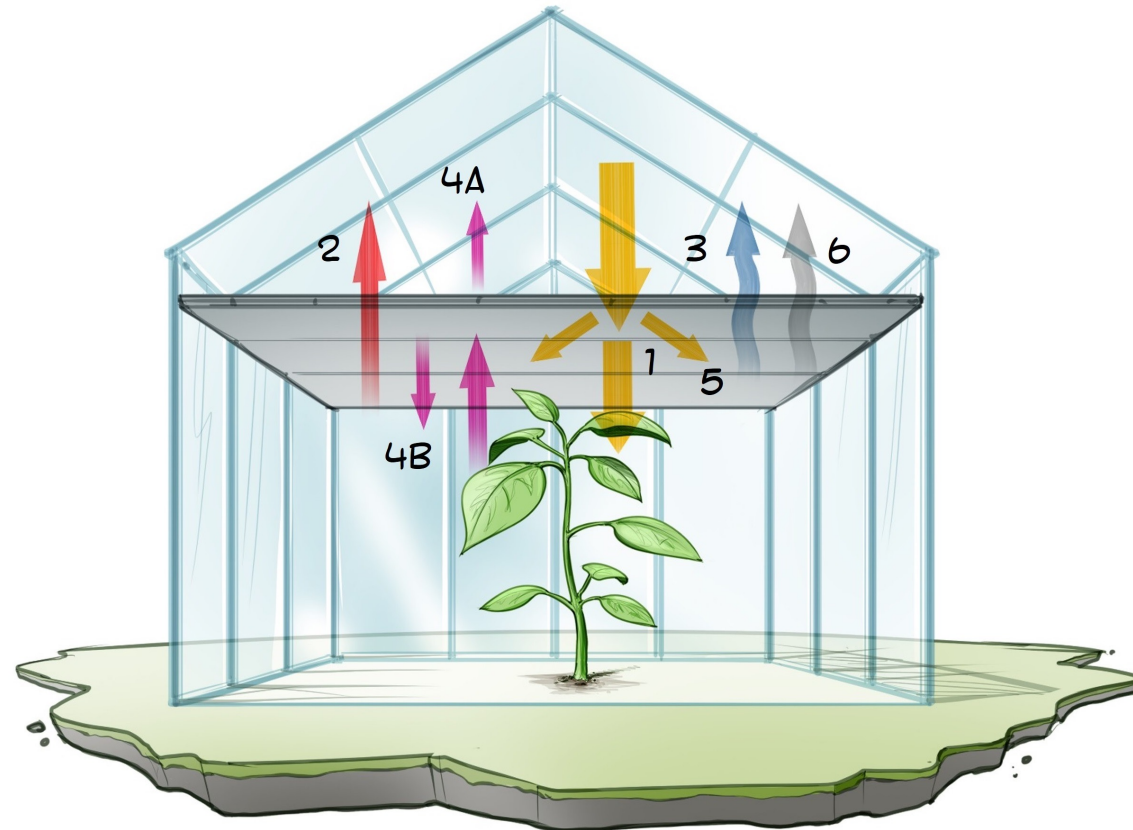
 svensson

# Svensson - a family business since 1887





# Properties of climate screens



- 1 = Light transmission
- 2 = Thermal insulation
- 3 = Moisture permeability
- 4 A/B = Heat emission transmission and reflection
- 5 = Diffuse light
- 6 = Air permeability

# Maximum light transmission while saving energy



# LUXOUS

Energy saving with maximum light  
transmission





Luxous 1147 H2no FR

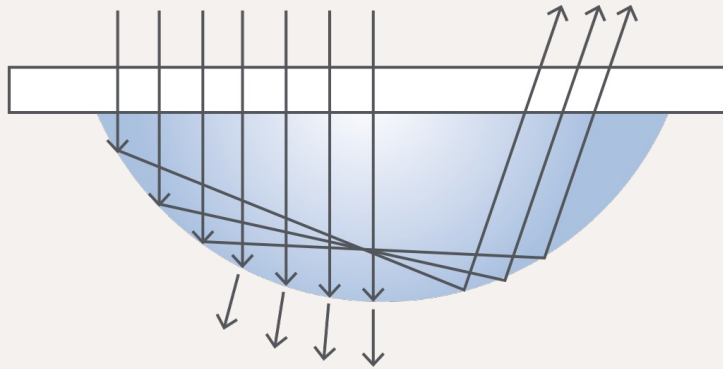
**Up to 8% more light in  
condensing conditions**



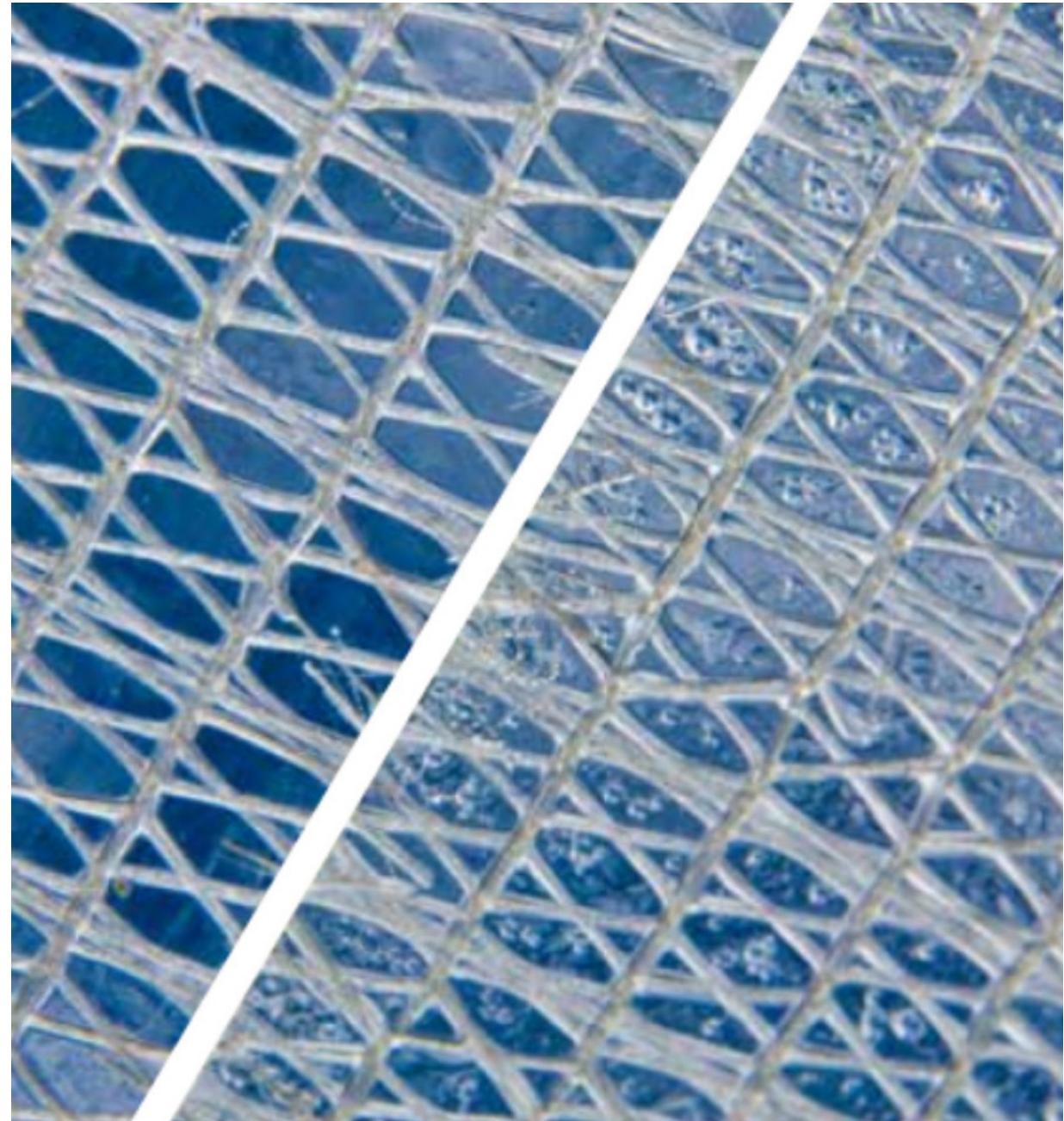
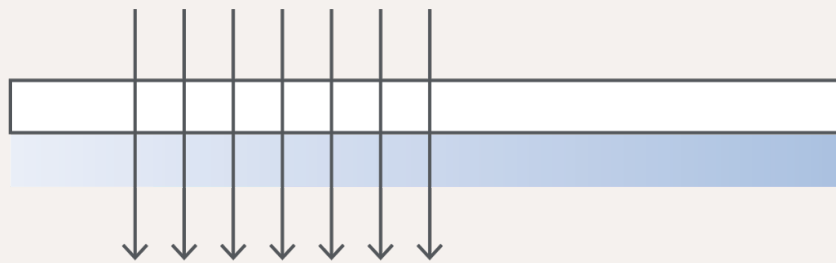


# The H2no technology

Without H2no technology



With H2no technology





**Keeps the light inside the  
greenhouse for maximum effect**

 **Obscura**  
From light restriction to total blackout





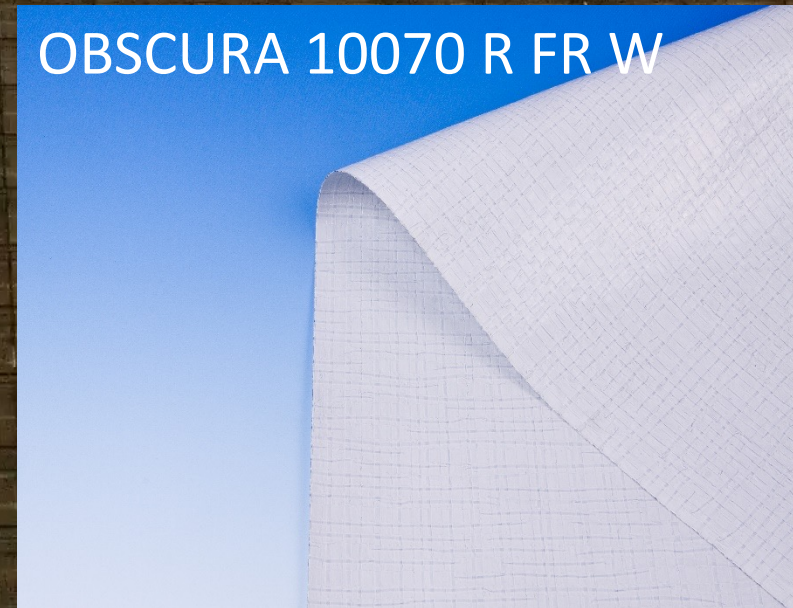
**Horizontal / Ceiling**

**OBSCURA 9950 FR W**



**Vertical / Gable**

**OBSCURA 10070 R FR W**





# High grade light diffusion for higher photosynthesis



# Harmony

High grade light diffusion



# Homogenous climate



Direct light



Diffused light

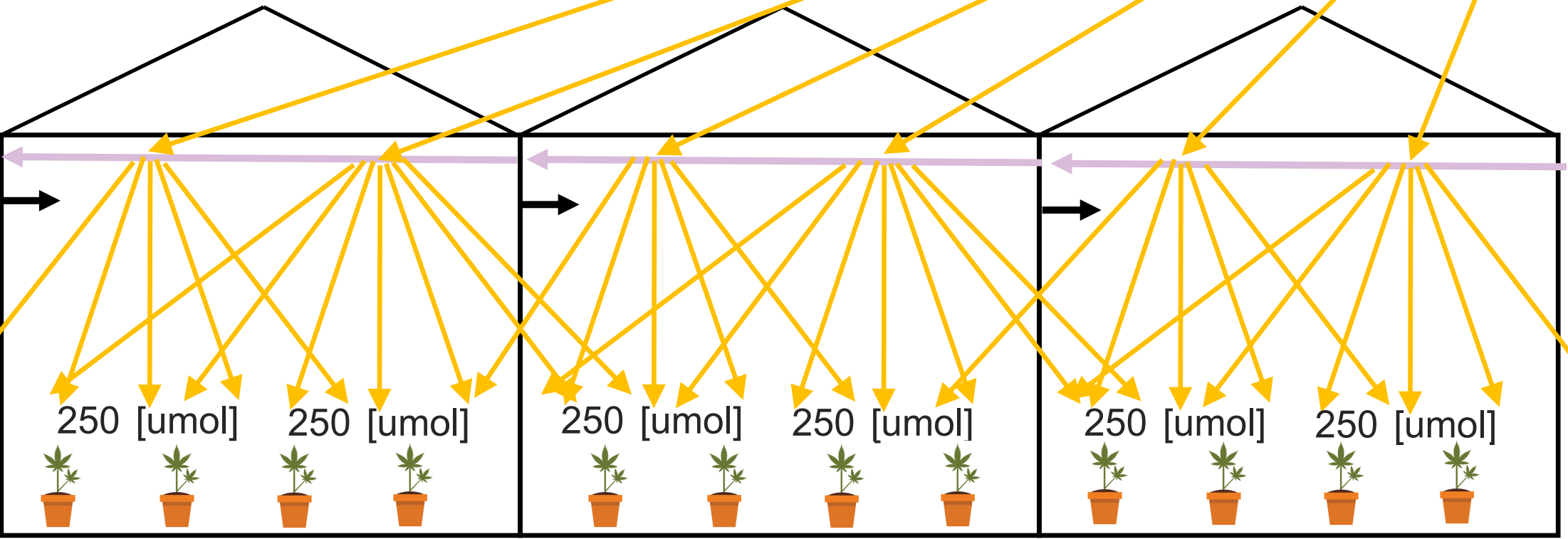






550 [W/m<sup>2</sup>]

Grow soft light – PAR PERFECT



250 [umol]

250 [umol]

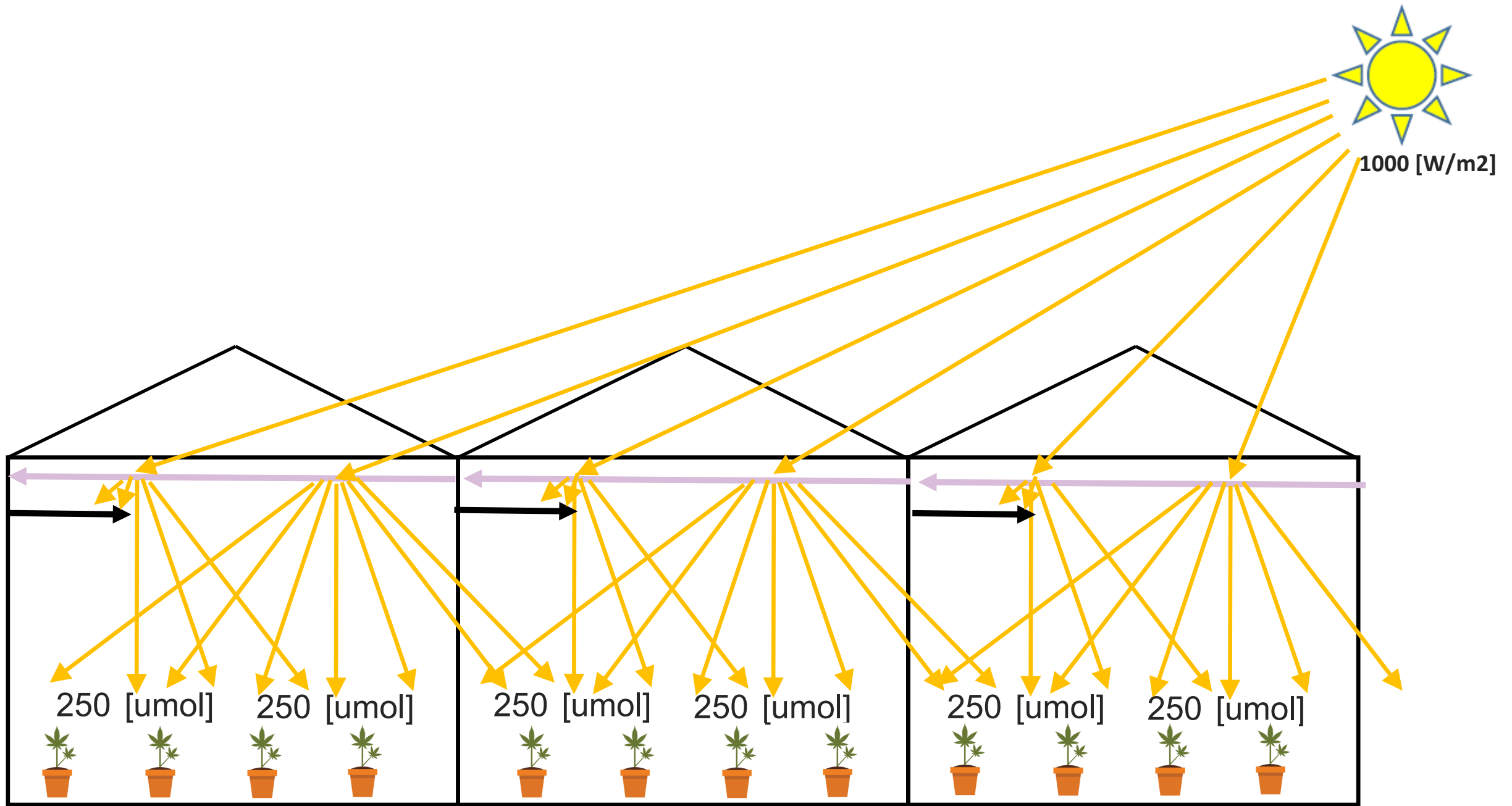
250 [umol]

250 [umol]

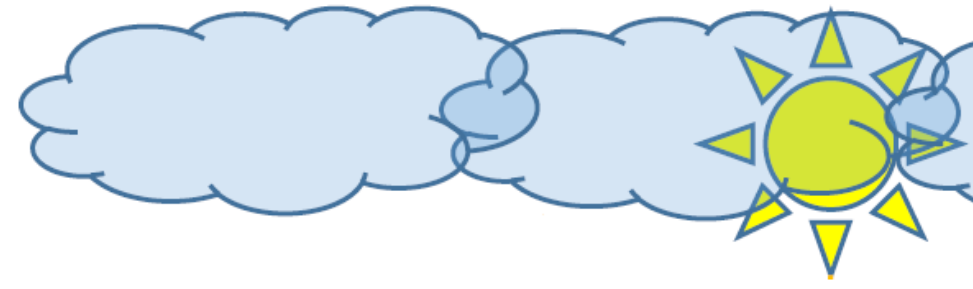
250 [umol]

250 [umol]

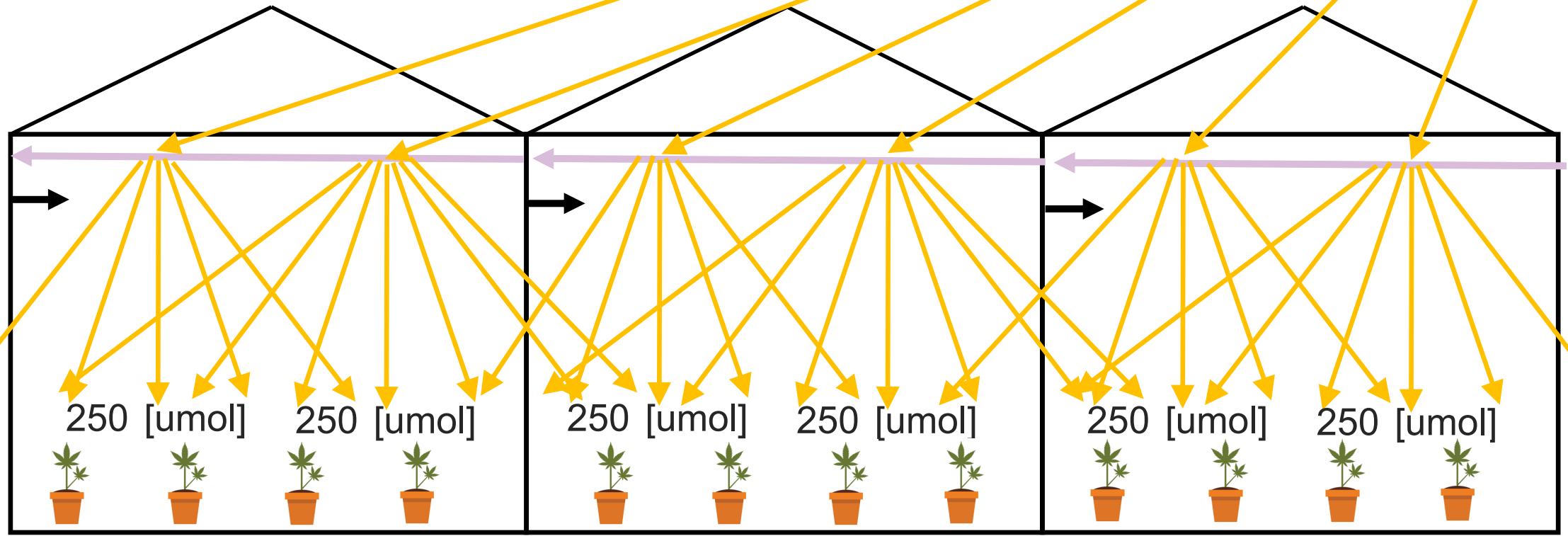








550 [W/m<sup>2</sup>]



250 [umol]

250 [umol]

250 [umol]

250 [umol]

250 [umol]

250 [umol]



”  
Welcome  
Hinova to the  
Svensson  
family.

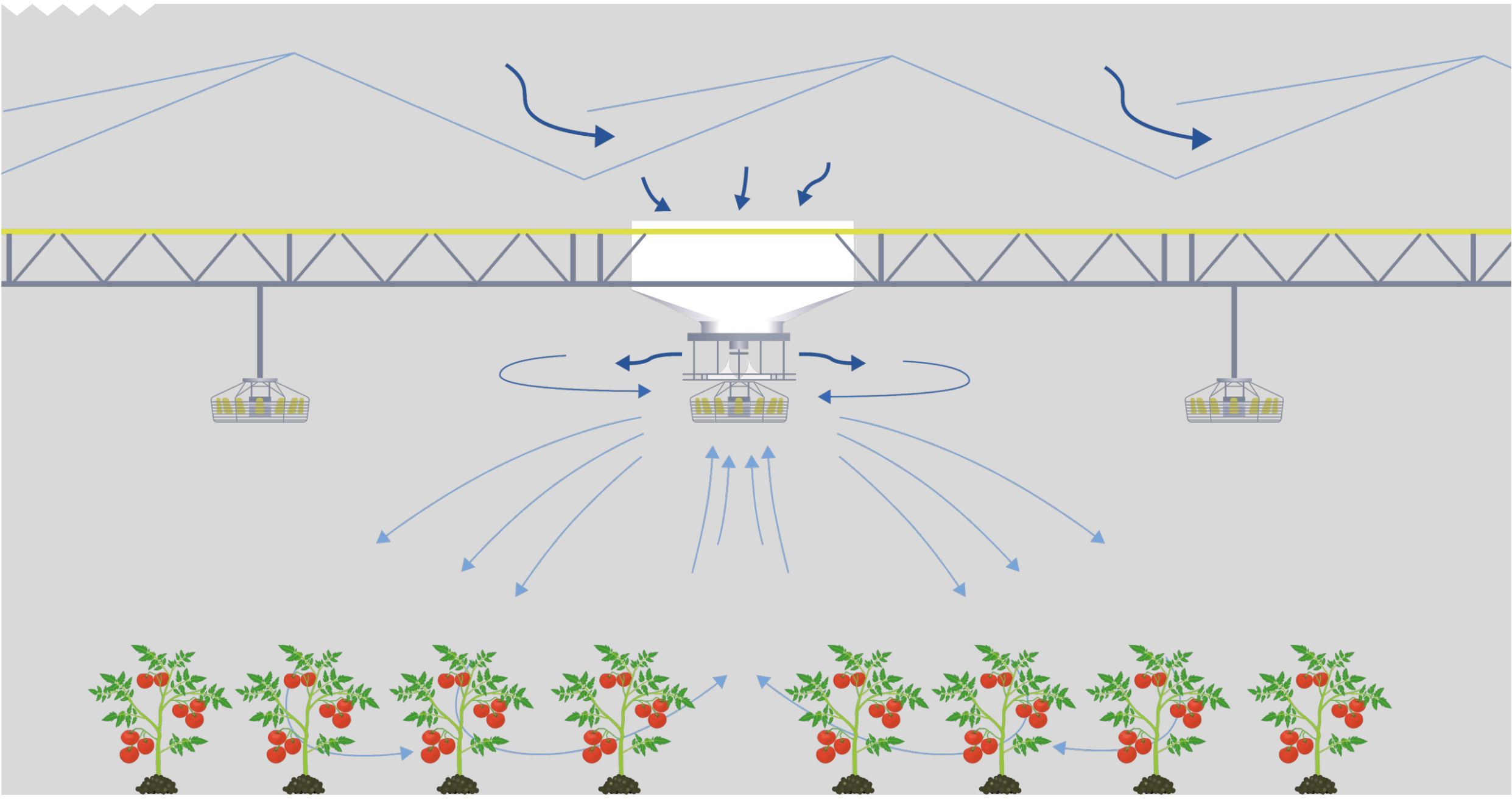
**Grow with the flow.  
ClimaFlow.**





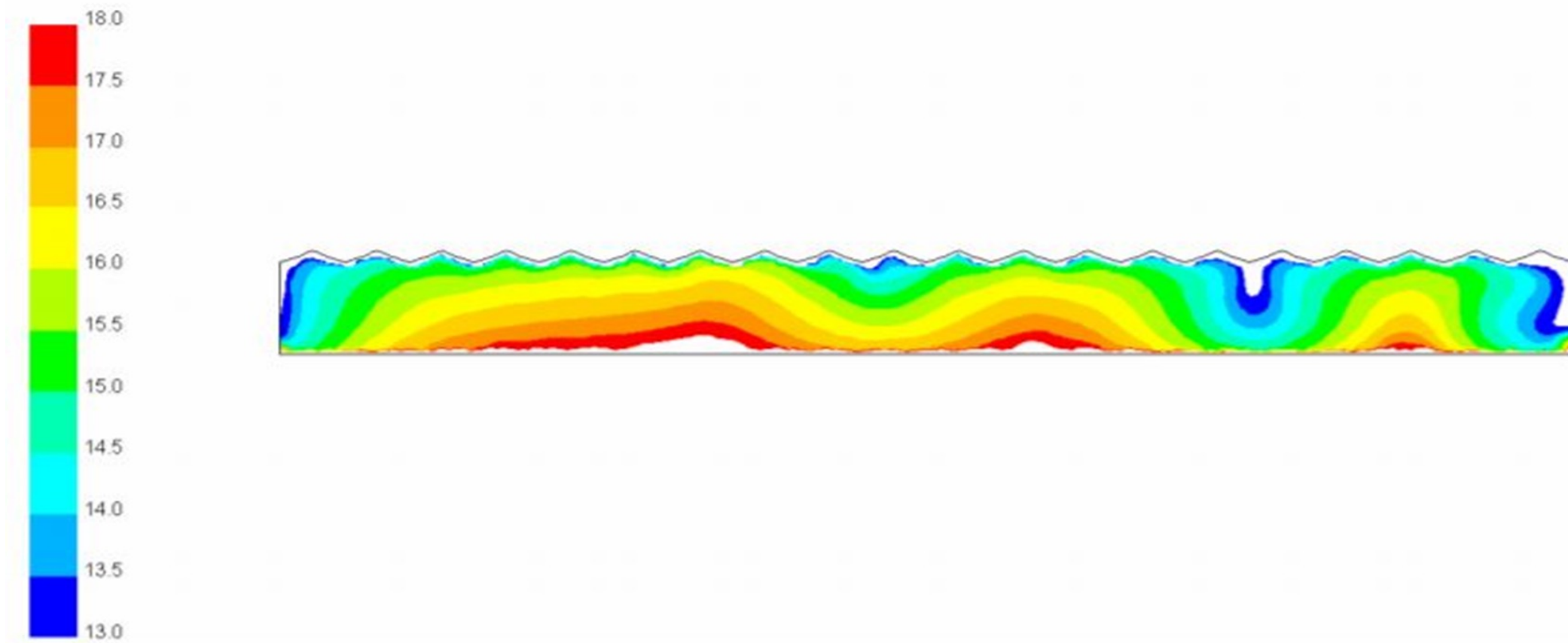


”  
**Welcome  
Hinova to the  
Svensson  
family.**

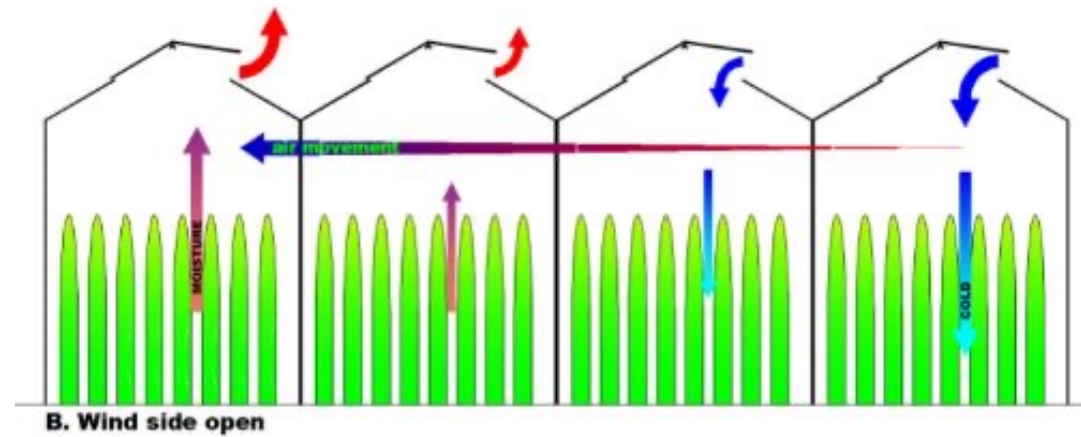
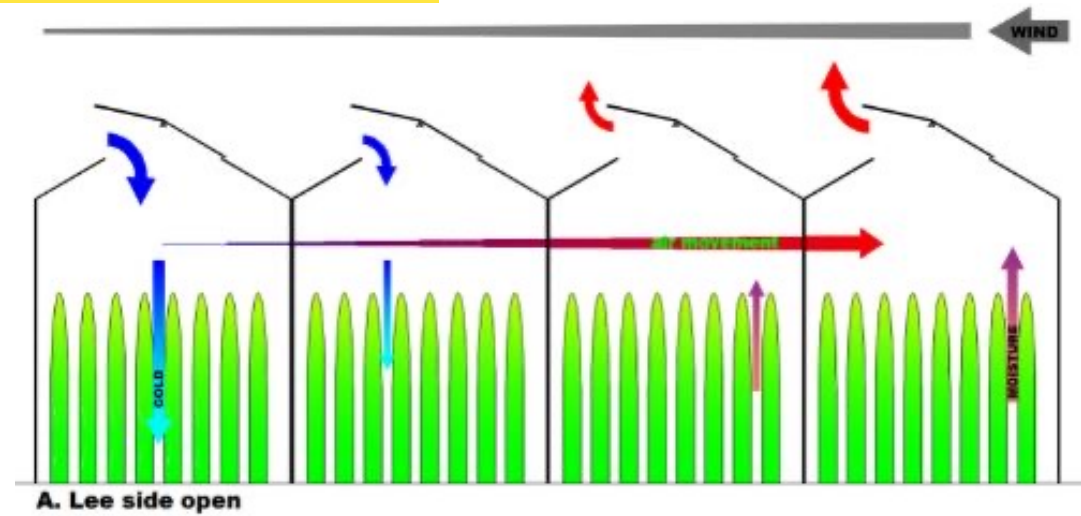




# Homogenous climate

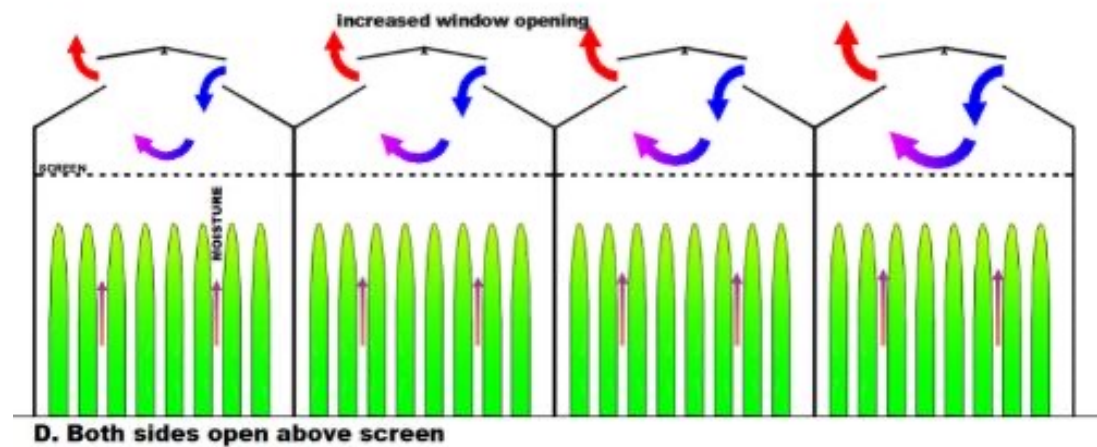
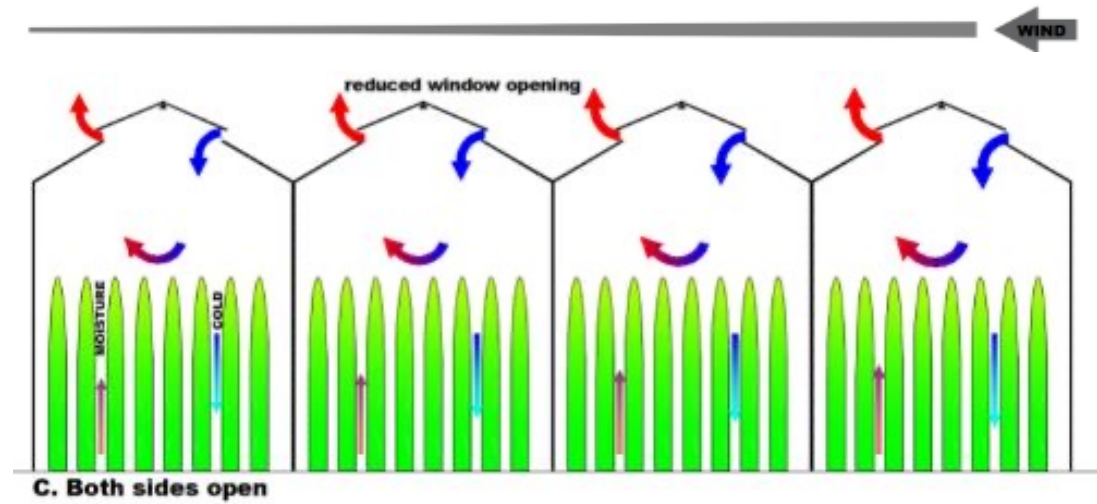


# Homogenous climate



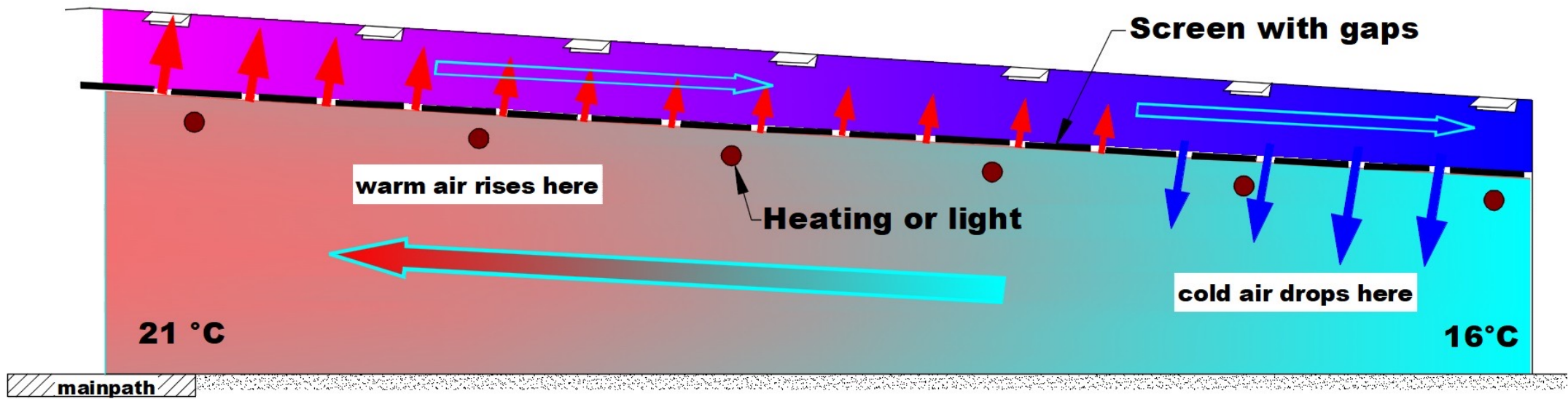


# Homogenous climate

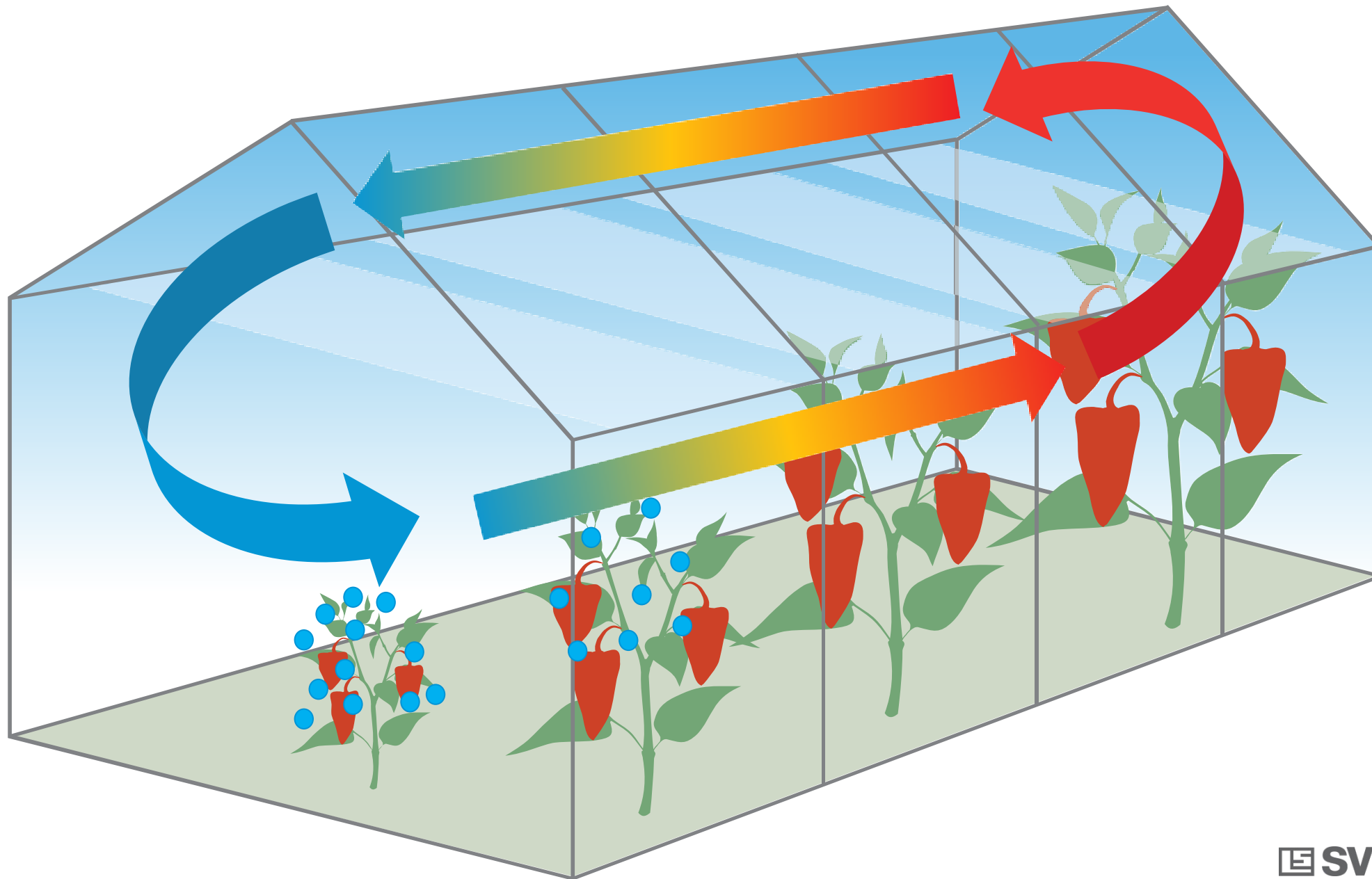


# Homogenous climate

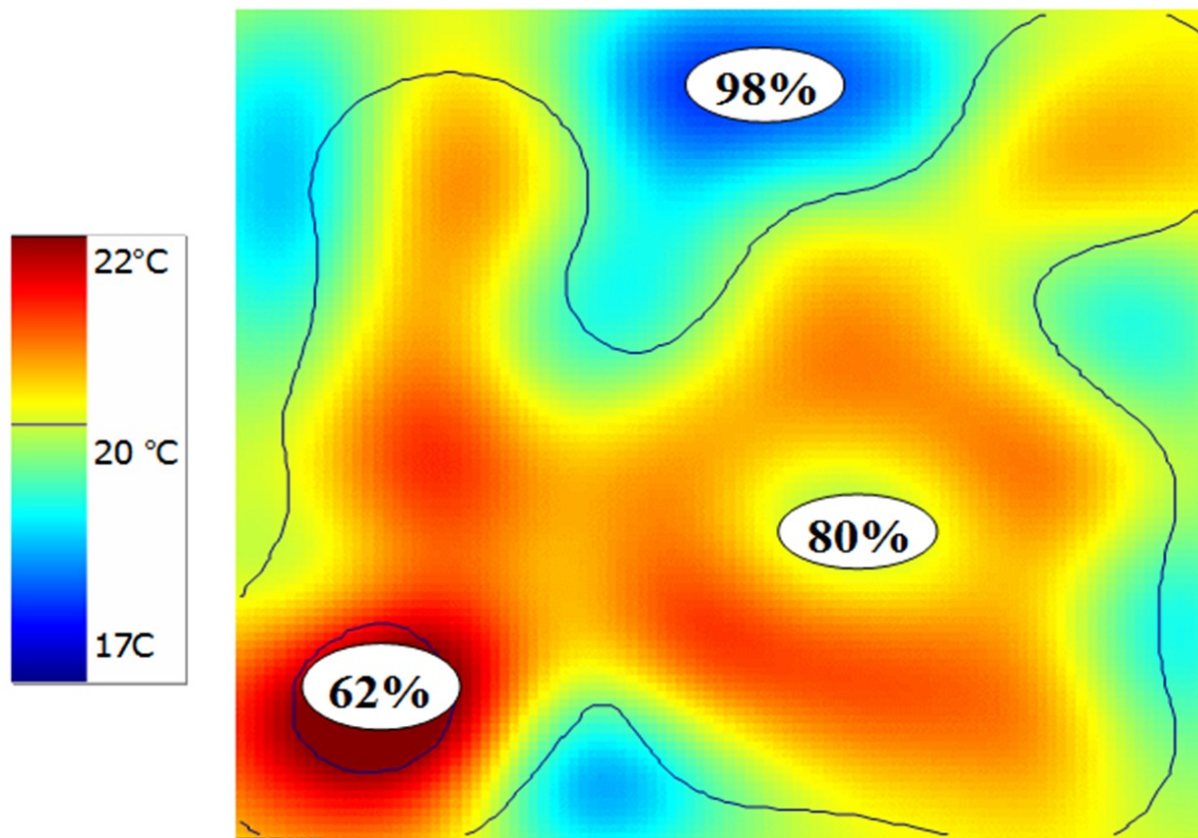
Warm air above the screen cools down and travels to the lowest point







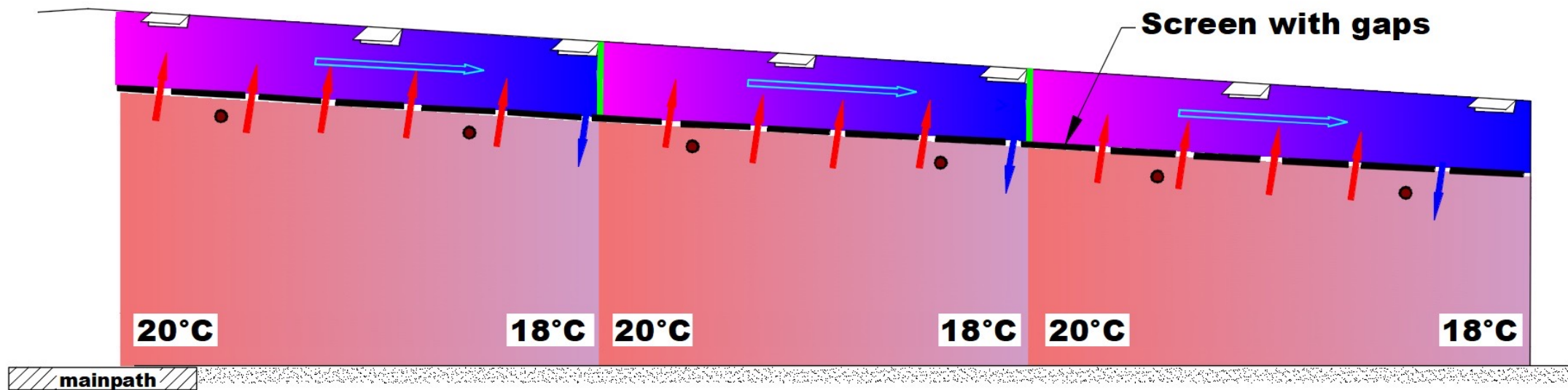
# Homogenous climate

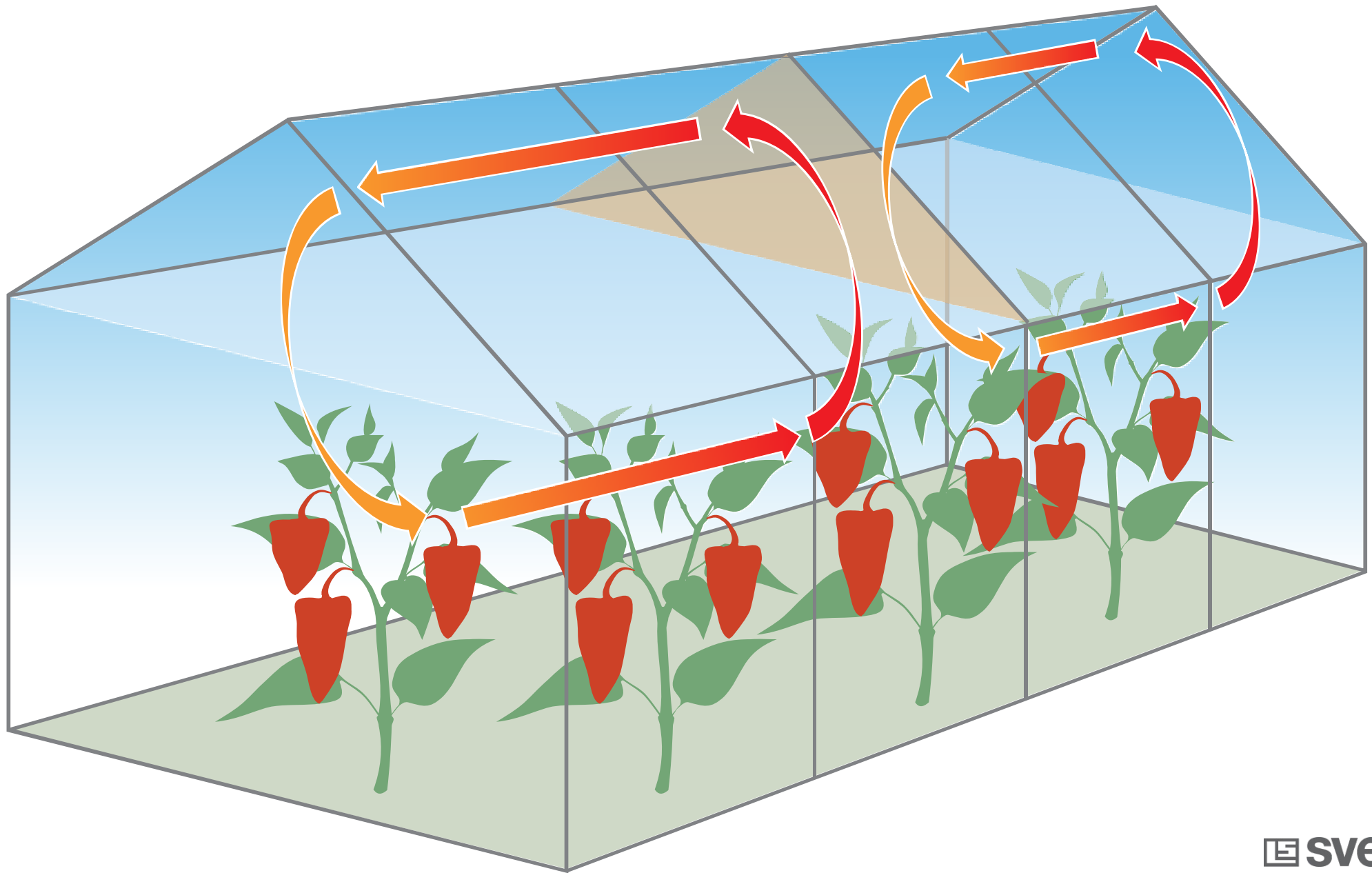




# Homogenous climate

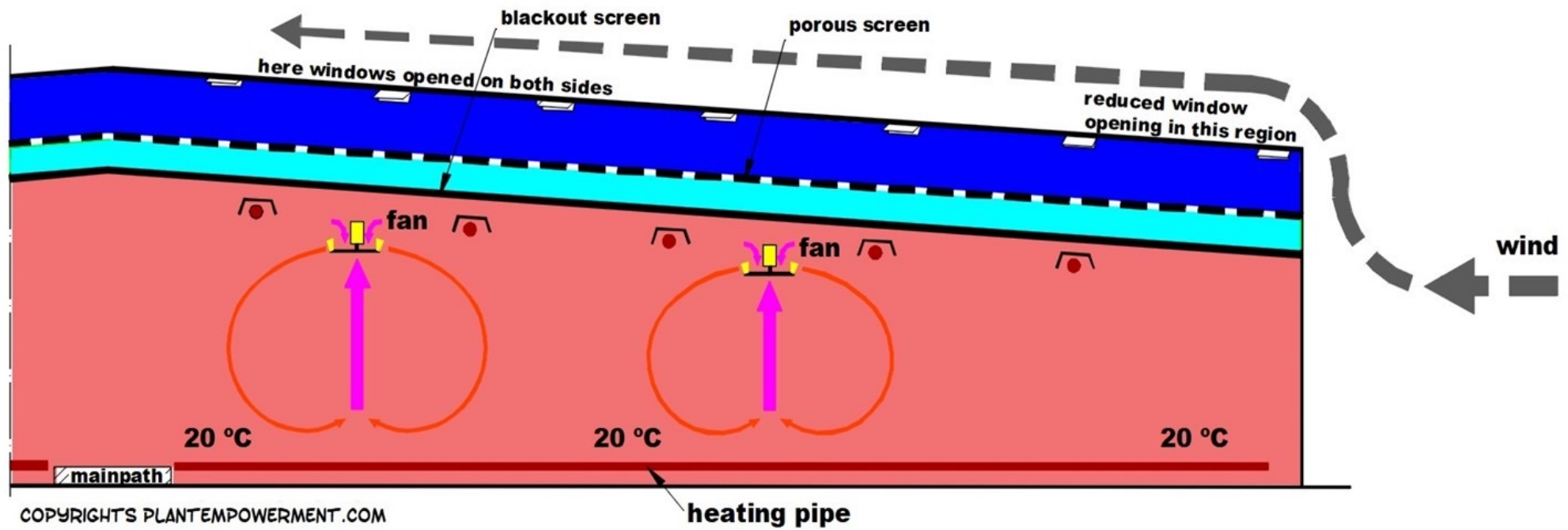
Vertical screens divide the area above the screen in 3 sections







# Homogenous climate

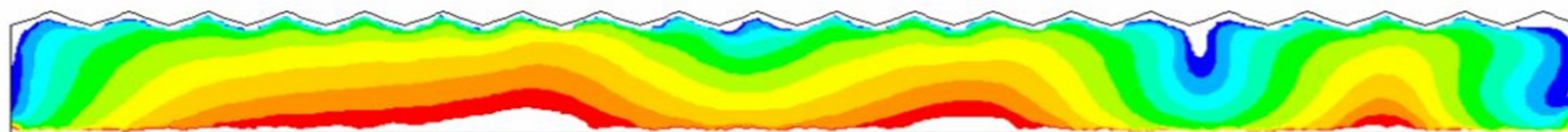




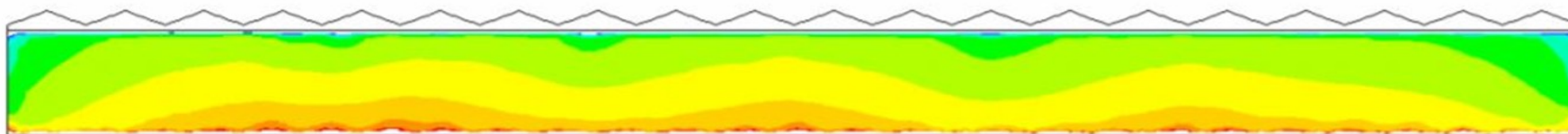




# Homogenous climate



A

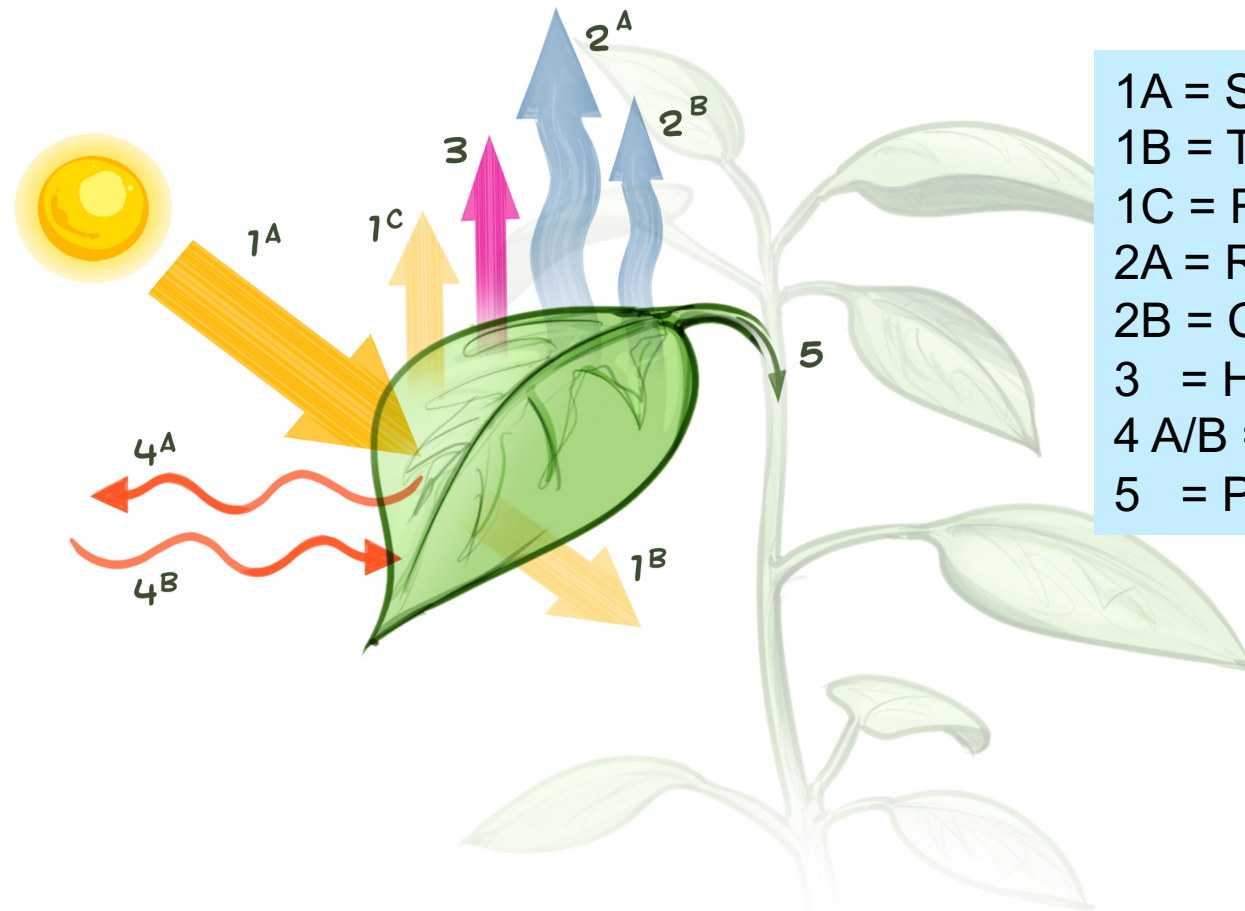


B



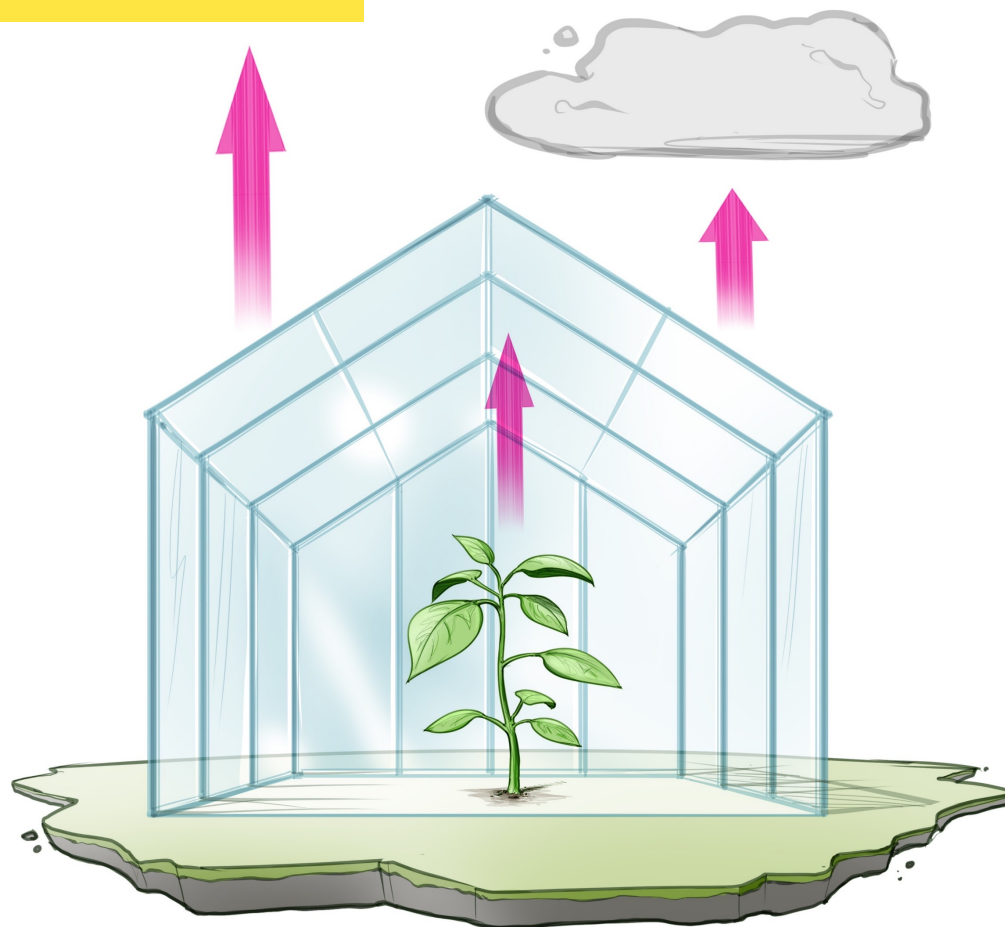


# Energy Balance



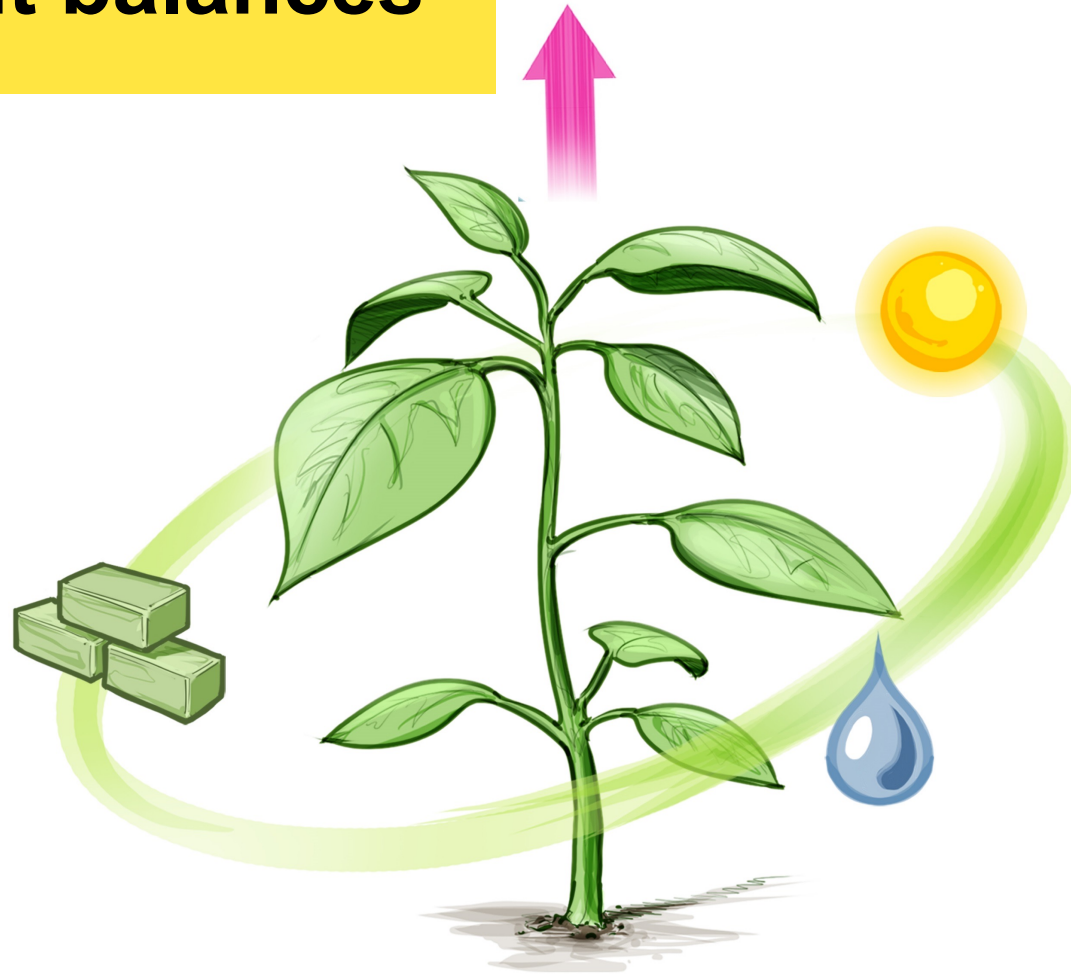
- 1A = Solar radiation
- 1B = Transmission
- 1C = Reflection
- 2A = Radiation evaporation
- 2B = Convection evaporation
- 3 = Heat emission
- 4 A/B = Convection
- 5 = Photosynthesis

# Homogenous climate





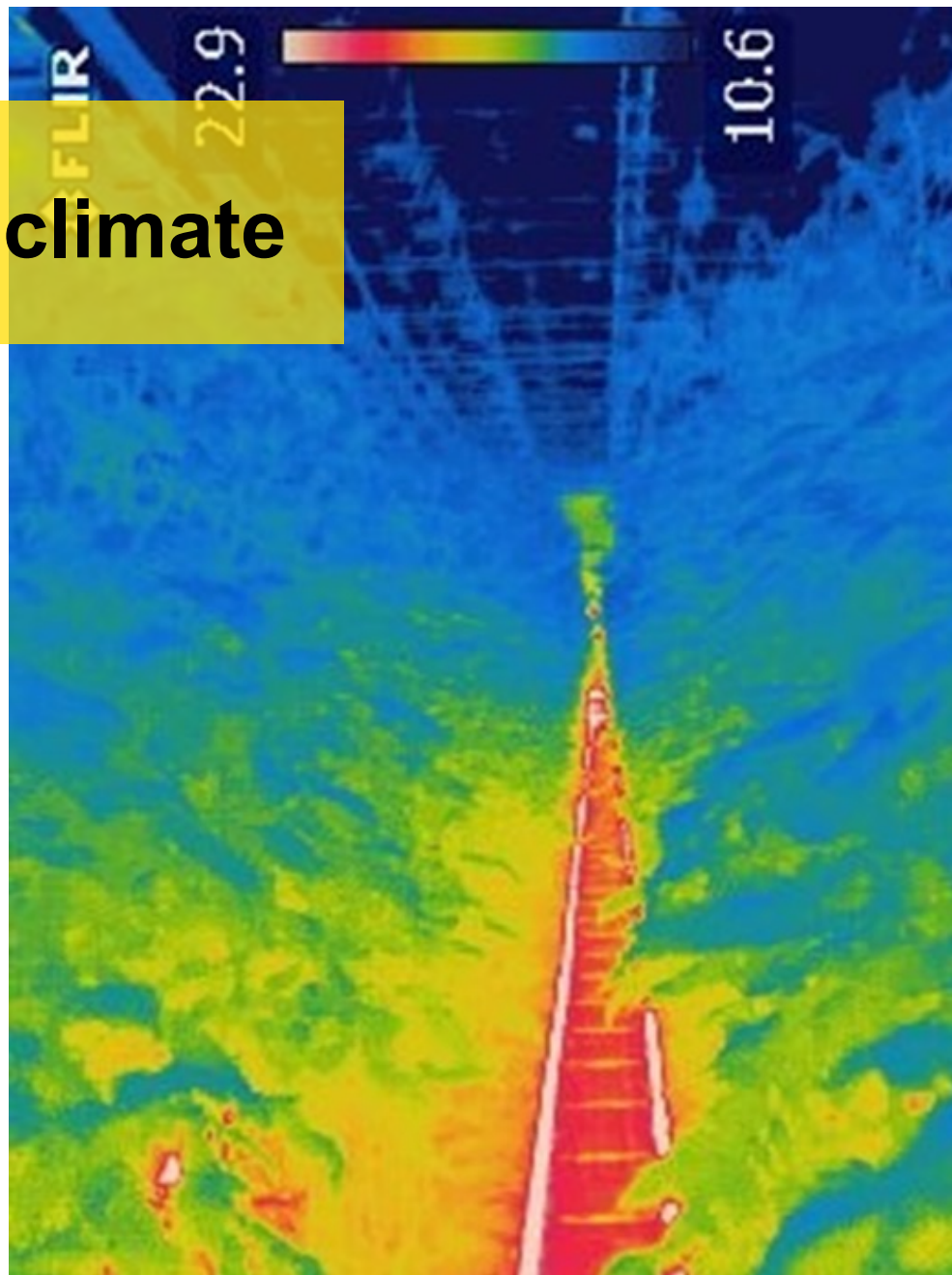
# Heat emission affects all three plant balances



- ✓ Evaporation
- ✓ Root pressure
- ✓ Calcium transport
- ✓ Assimilates transport
- ✓ Cell elongation
- ✓ Condensation risk

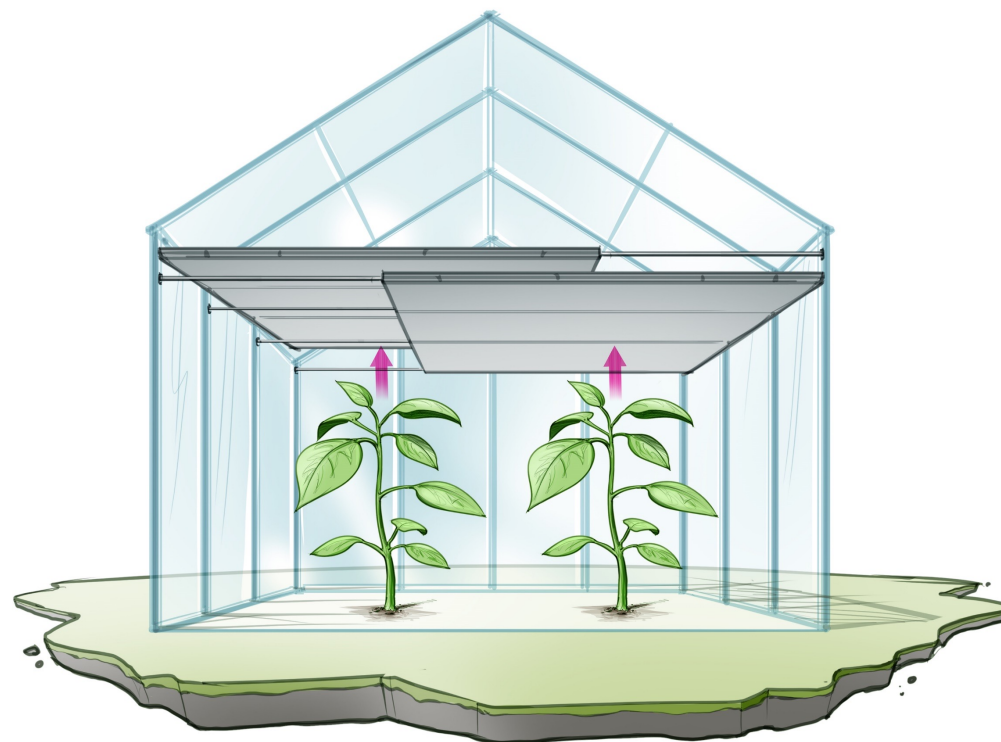
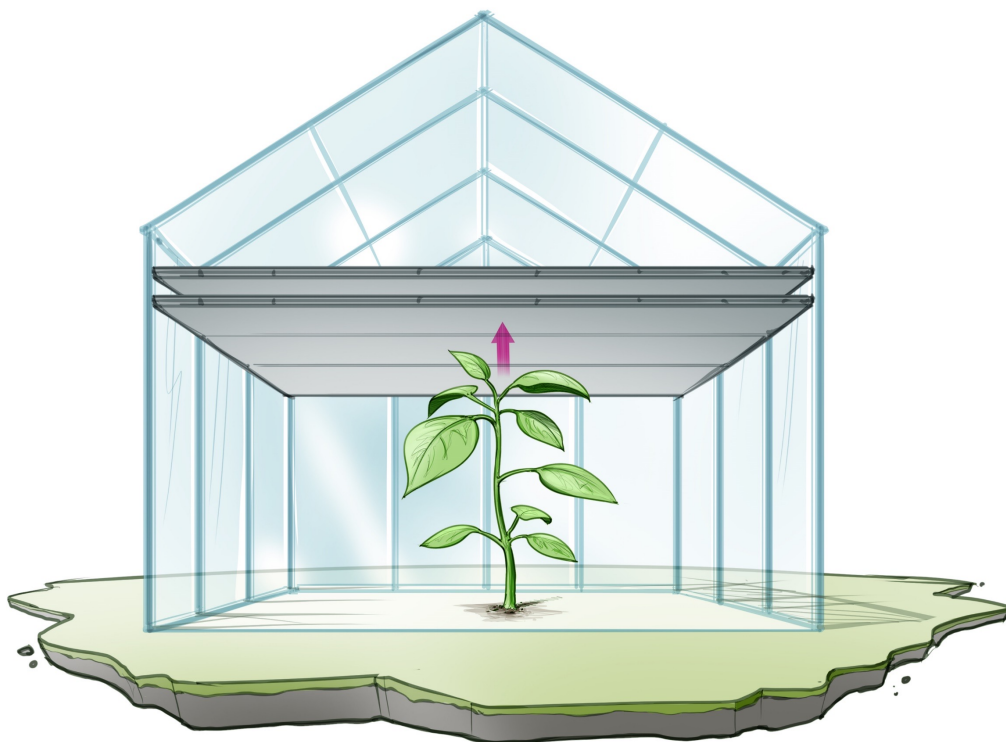
----- +  
Plant health and  
resilience

# Homogenous climate

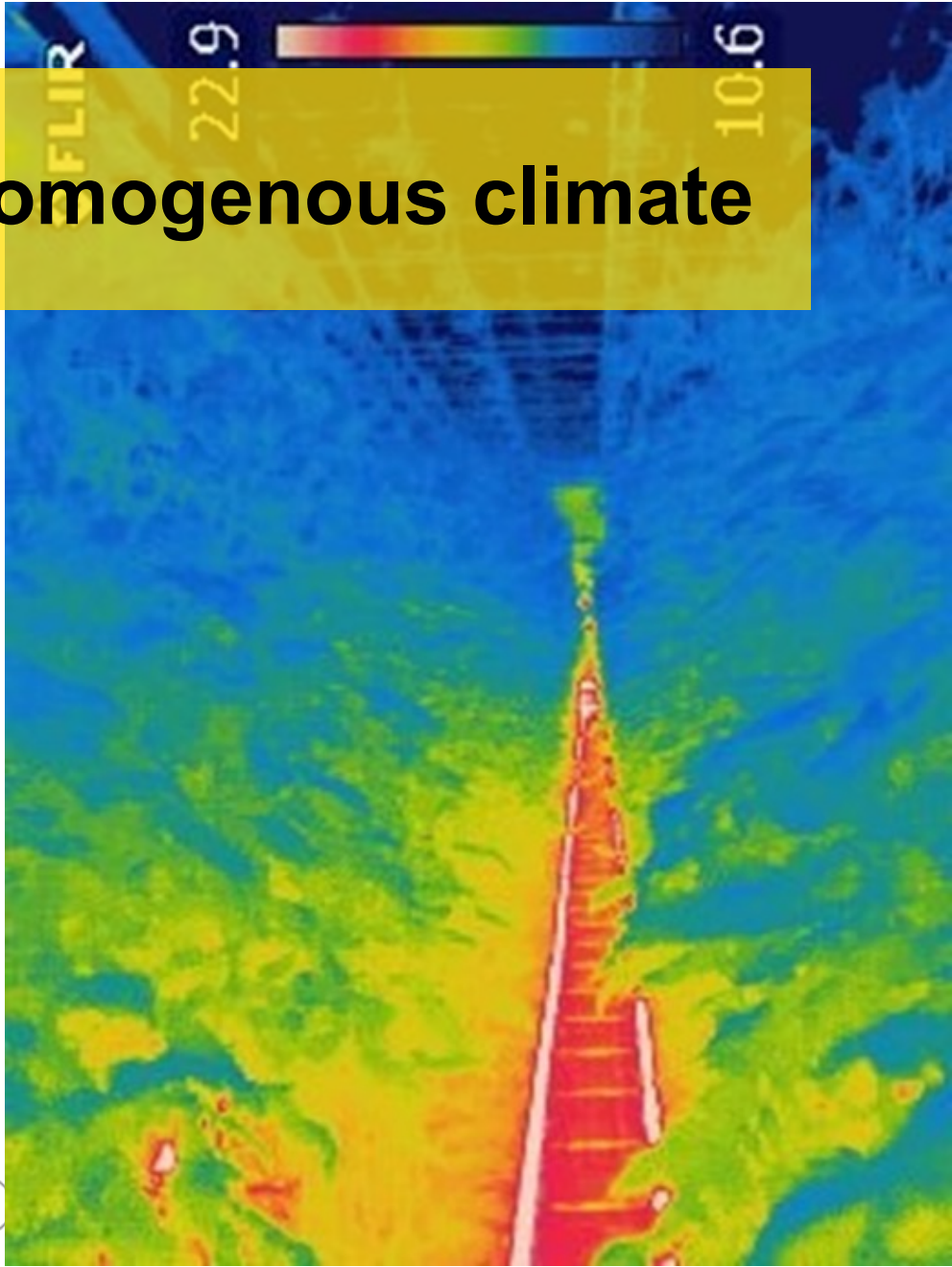




# Homogenous climate



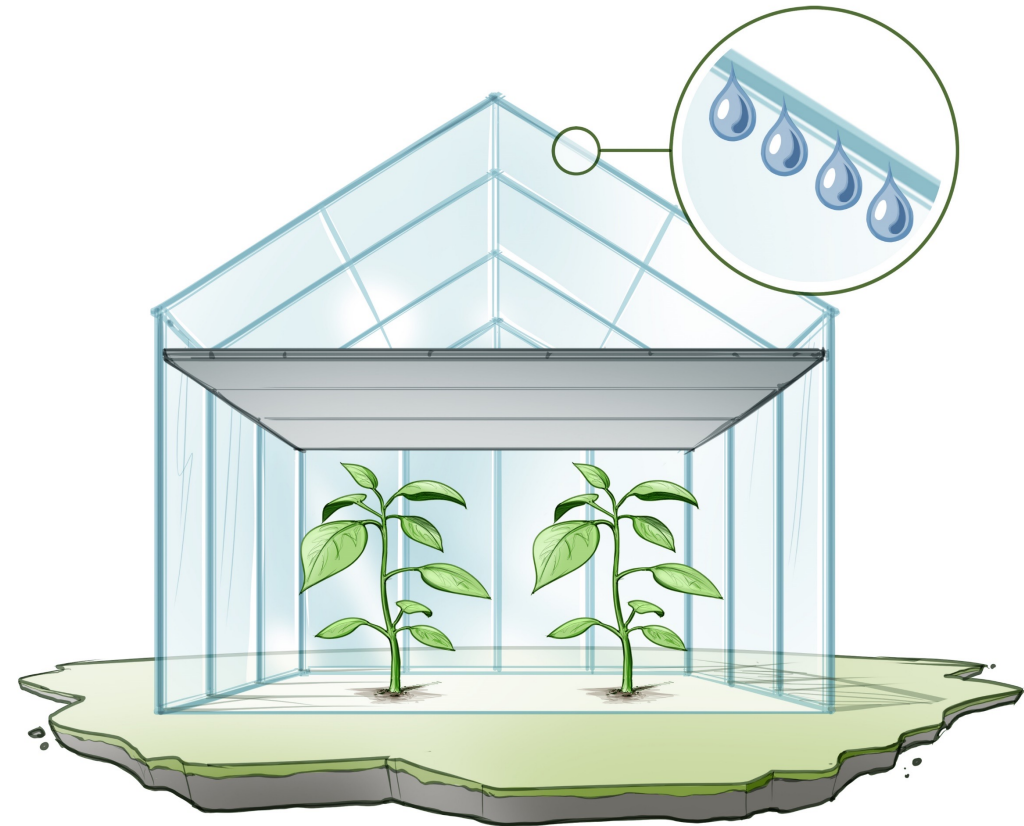
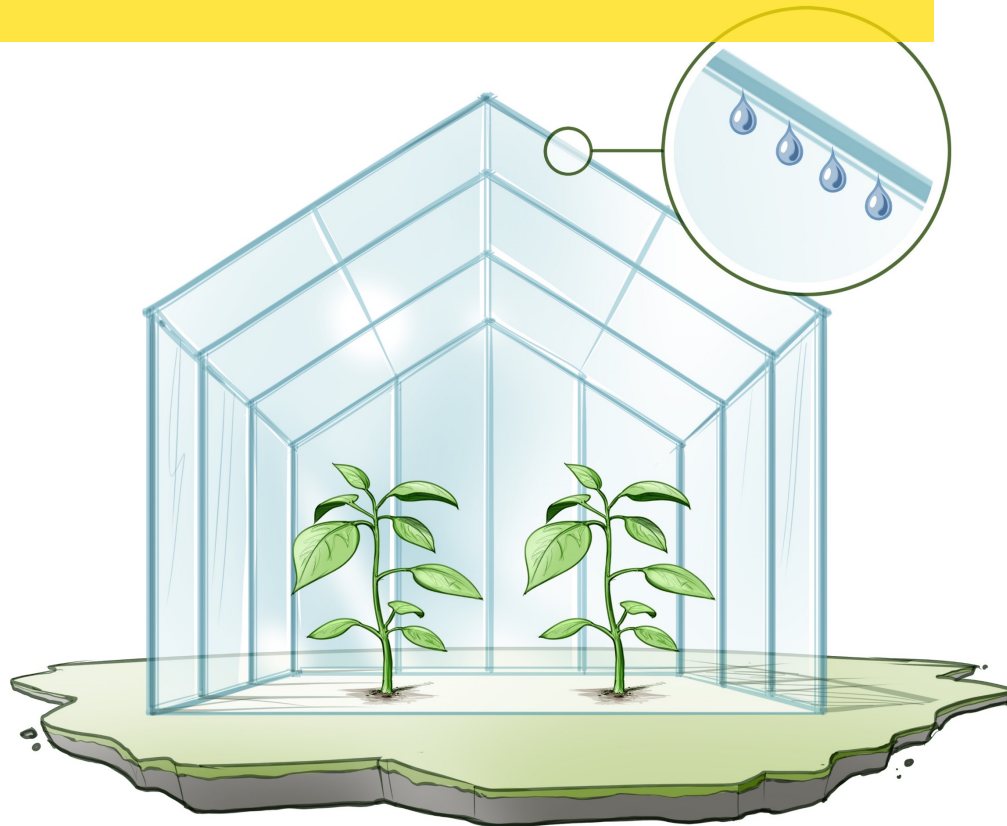
# Homogenous climate





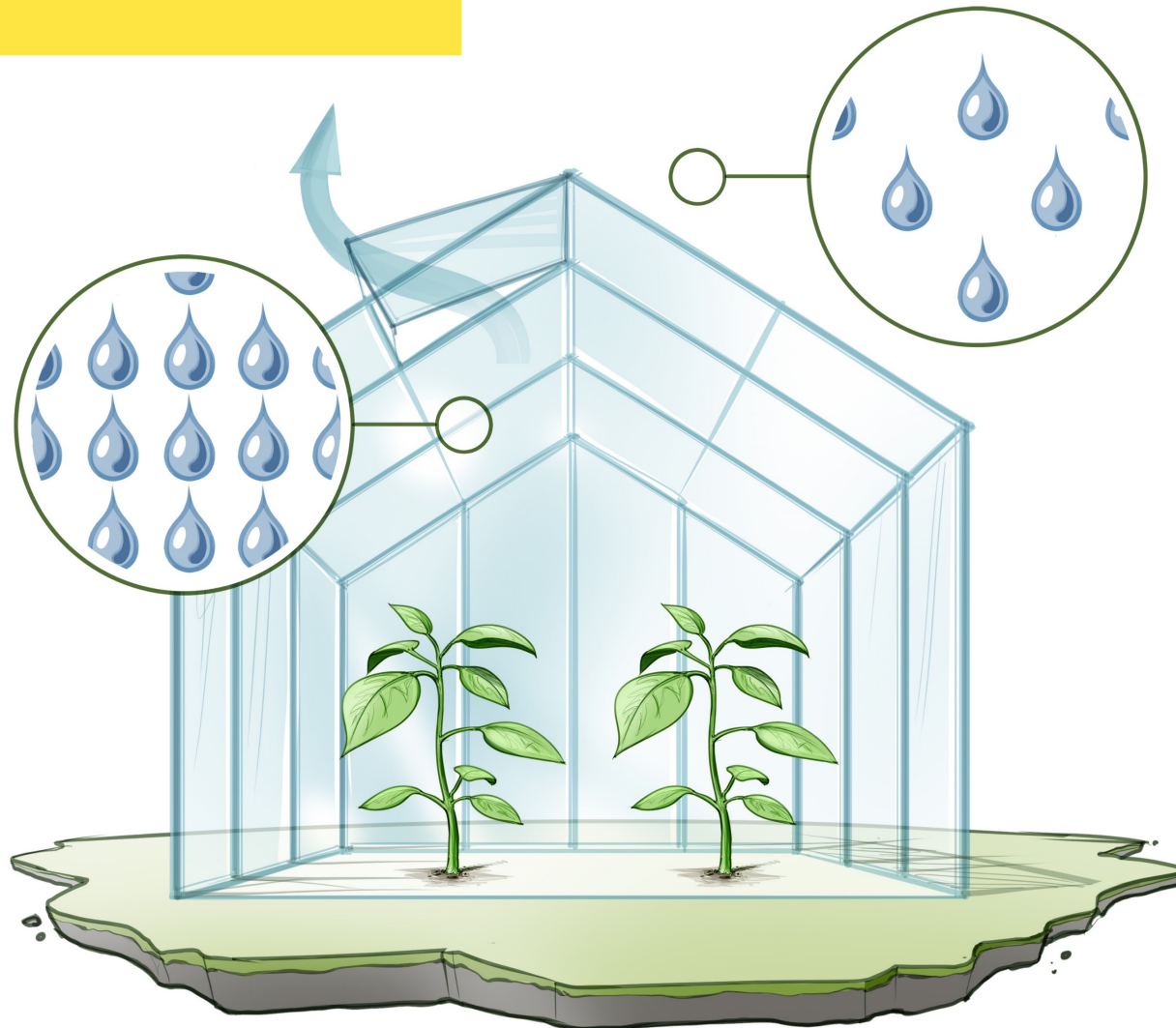


# Transport of moisture





# Transport of moisture







# Transport of moisture

	Sunlight	HPS	LED
PAR [ $\mu\text{mol}/\text{m}^2.\text{s}$ ]	200	200	200
PAR energy [ $\text{W}/\text{m}^2$ ]	42	42	42
Convective energy [ $\text{W}/\text{m}^2$ ]	indirect	30	23
NIR energy [ $\text{W}/\text{m}^2$ ]	47	36	--
UVB energy [ $\text{W}/\text{m}^2$ ]	5	--	--
Total energy supply [ $\text{W}/\text{m}^2$ ]	93	108	65

LED delivers 40% less energy for Transpiration than HPS!

HPS delivers 16% more energy for Transpiration than sunlight!

Energy production HPS: 1 Watt = 1 J/sec  $\rightarrow$  108 Watt \* 3600 = 388.800 J/h = 389 kJ/h

Energy production LED: 65 Watt \* 3600 = 234.000 J/hour = 234 kJ/h



A photograph of two men in a greenhouse. The man on the left has a beard and is wearing a white protective suit and blue gloves, standing on an orange cart. The man on the right is wearing a blue polo shirt. They are both looking upwards at the plants. The greenhouse is filled with rows of green plants, and the structure of the building is visible in the background.

Questions?

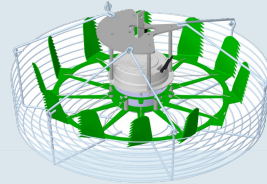


# ClimaFlow System



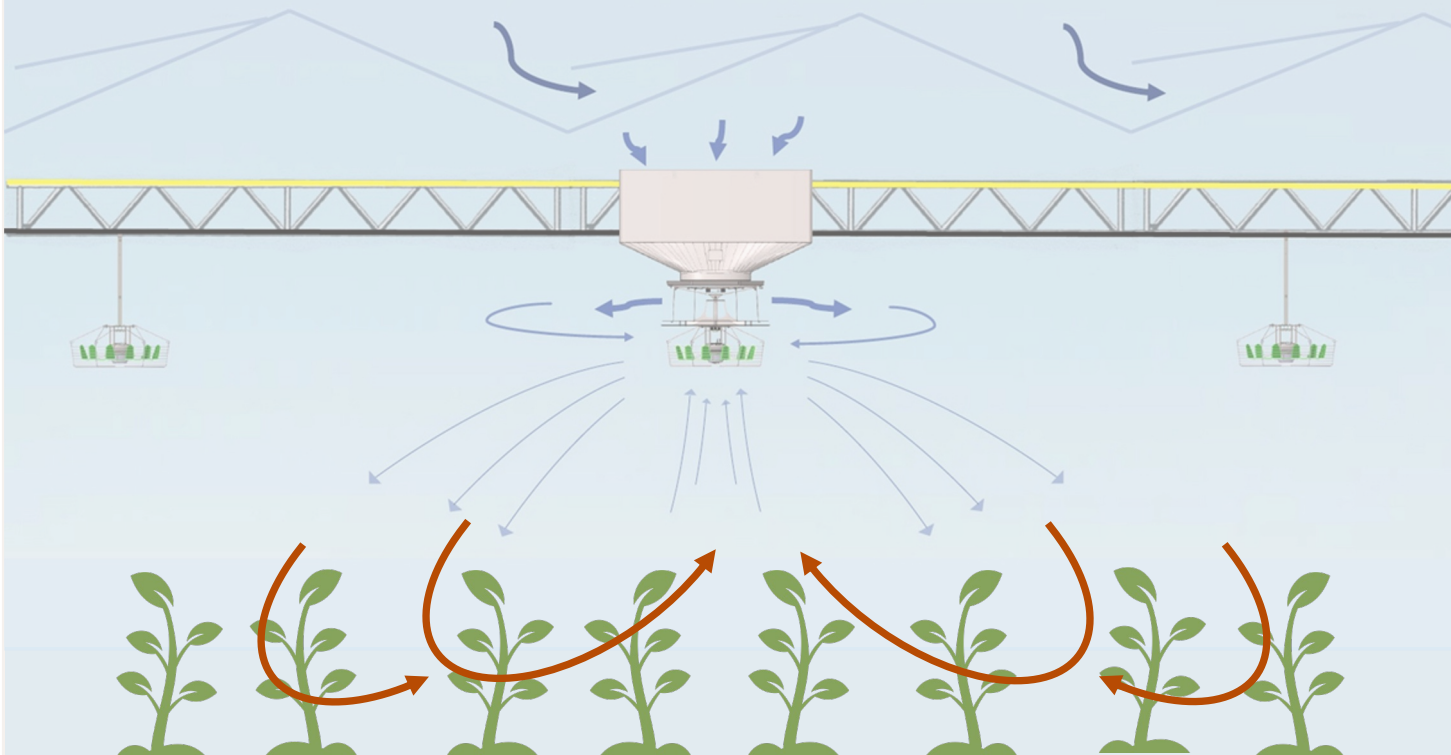
**VentilationJet**

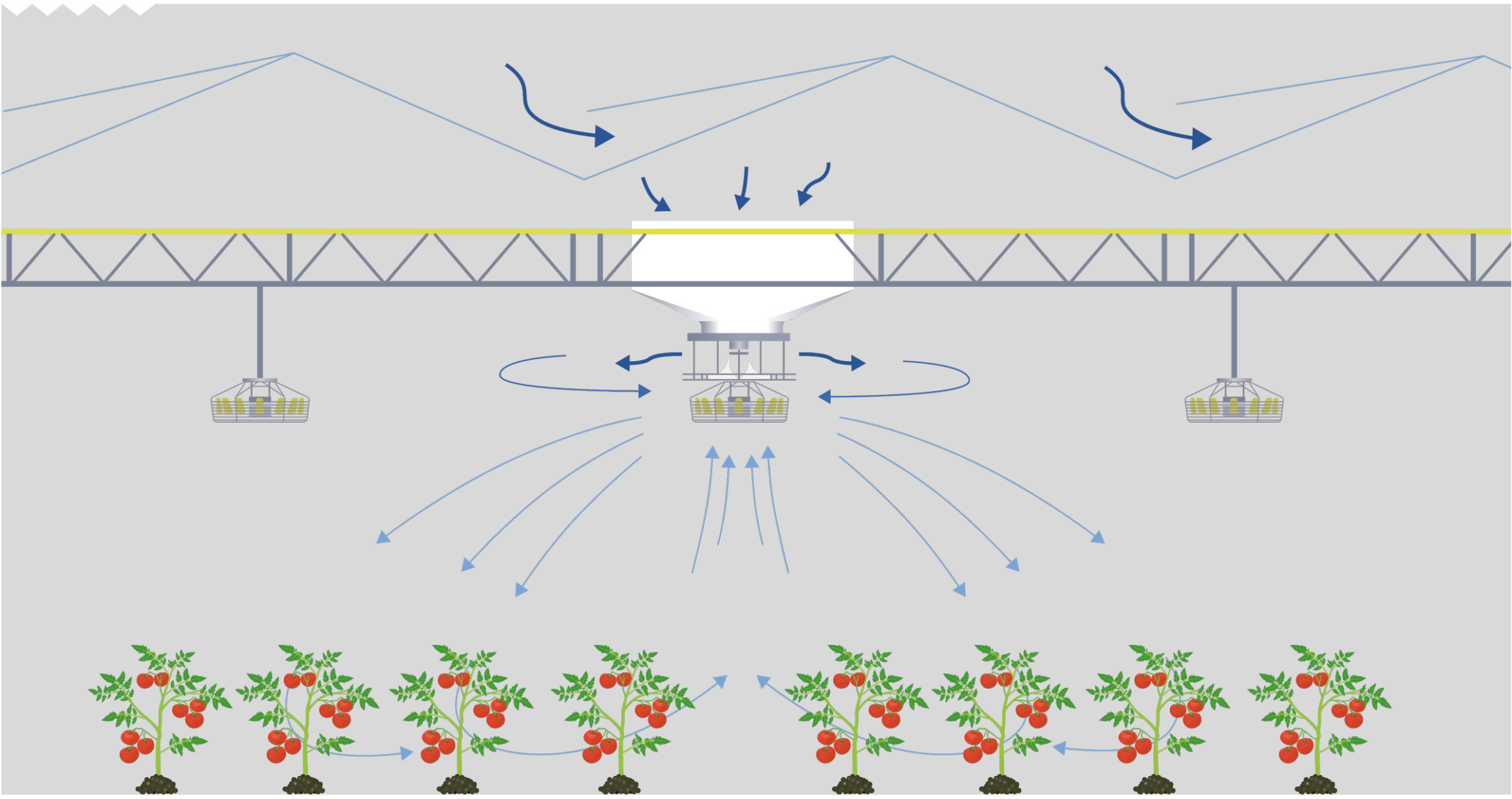
Draw air from above  
the screen



**ClimaFlow Fan**

Vertical distribution  
of air





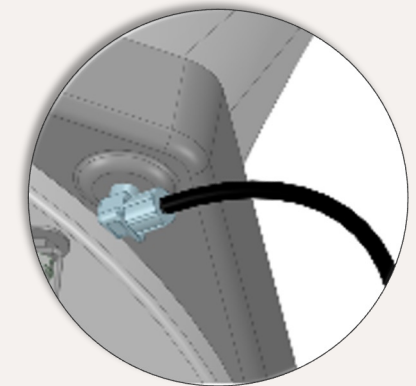
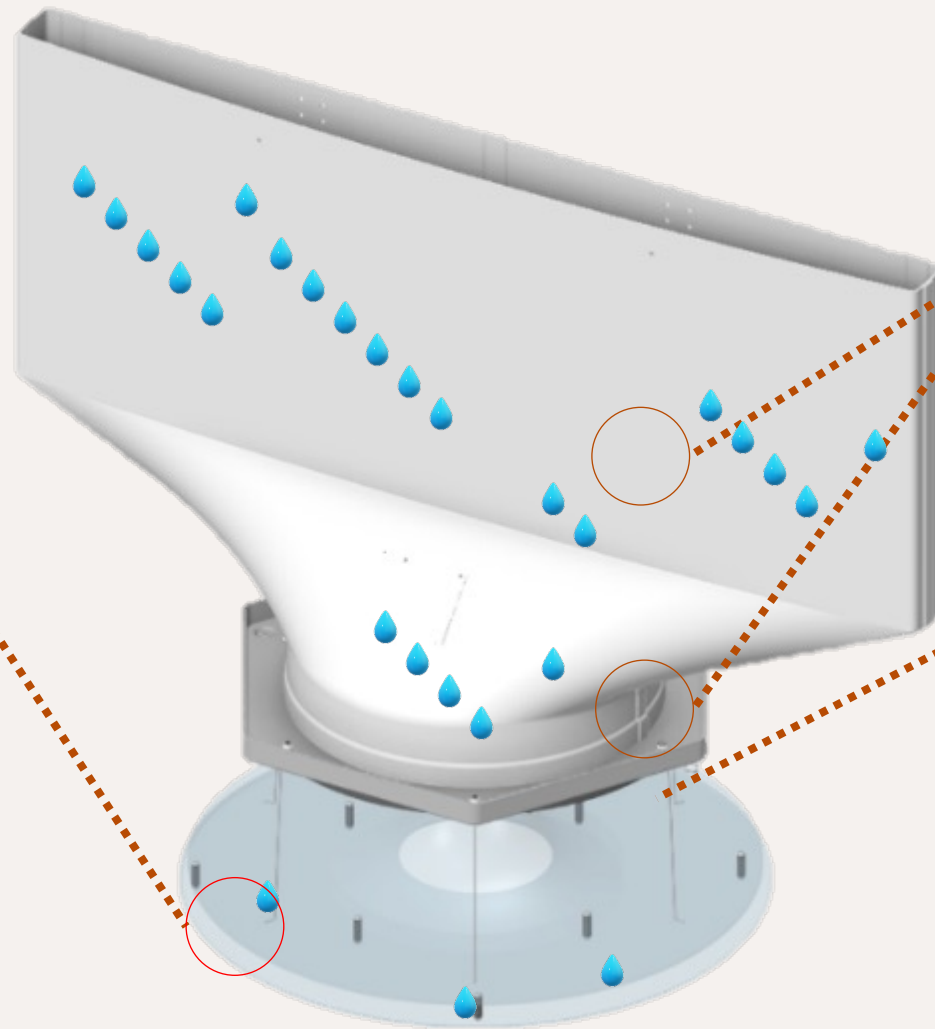


# VentilationJet

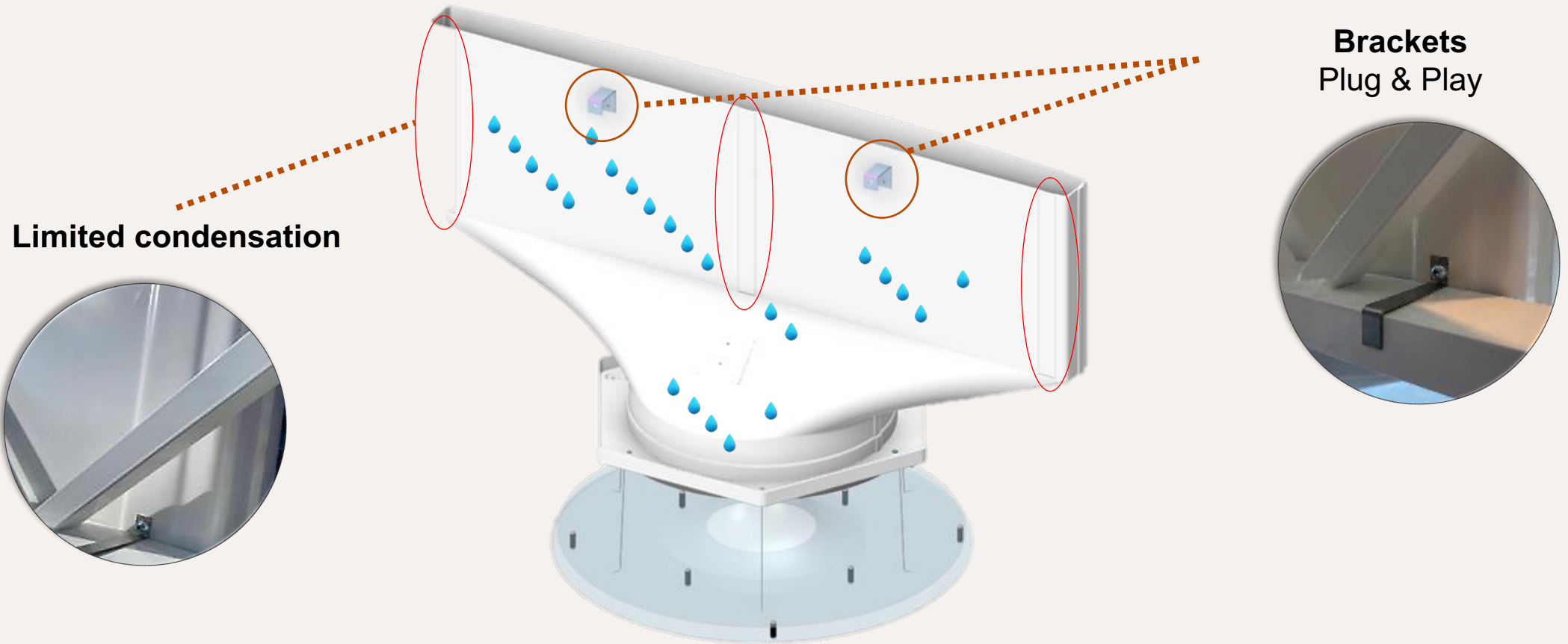
**Air flow plates**  
Limited shading  
Minimize condensation  
Collects moisture

**High quality materials**  
Light weight  
3<sup>rd</sup> edition

**Condensation plate**



# Ventilation Jet – The back

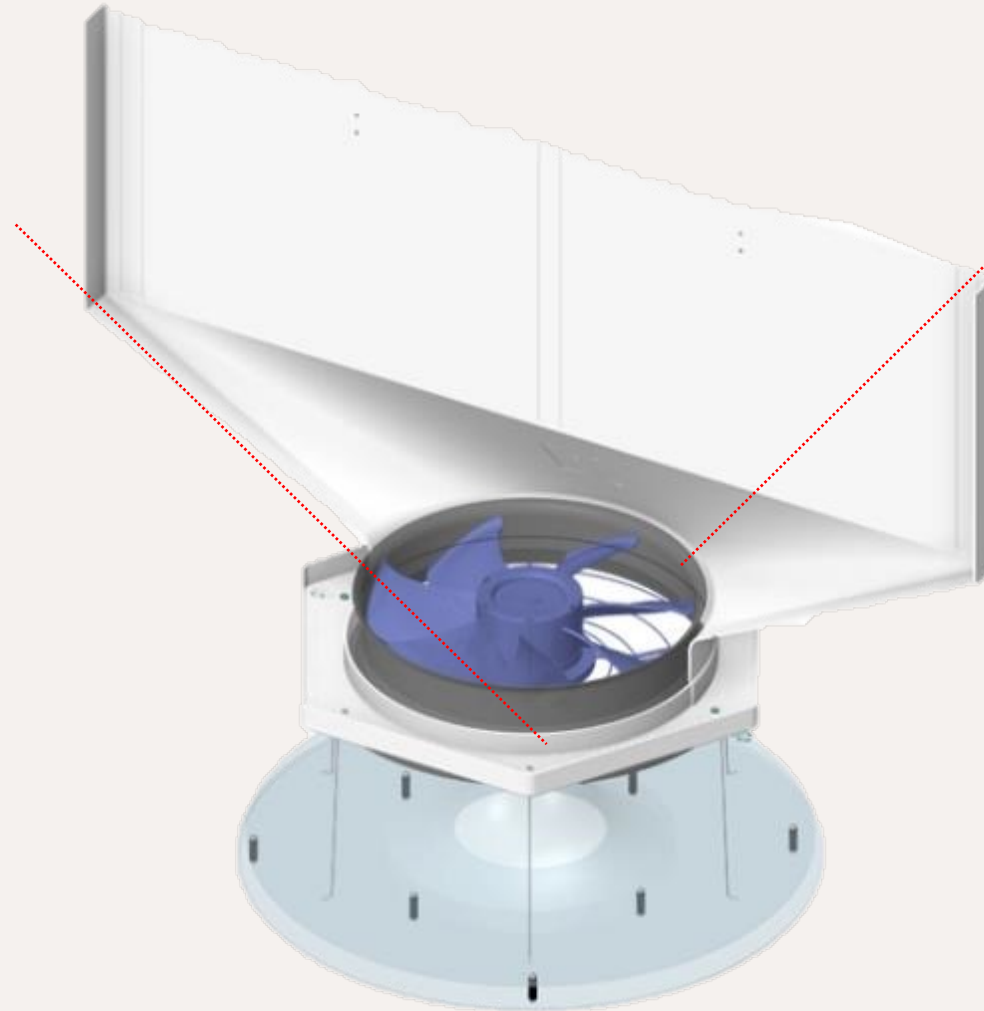




# Ventilation Jet – The heart

## Motor

Energy efficient  
Different growing  
stadia & seasons



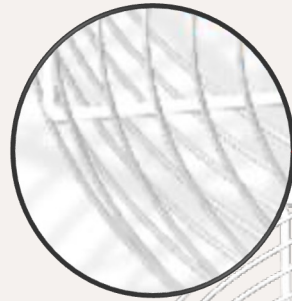
**Extremely quiet blade**  
Efficient impeller



# ClimaFlow Fan

## The base

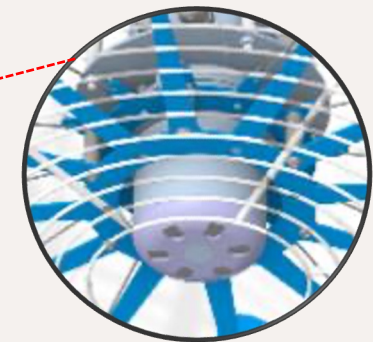
High performance materials



## Energy efficient motor

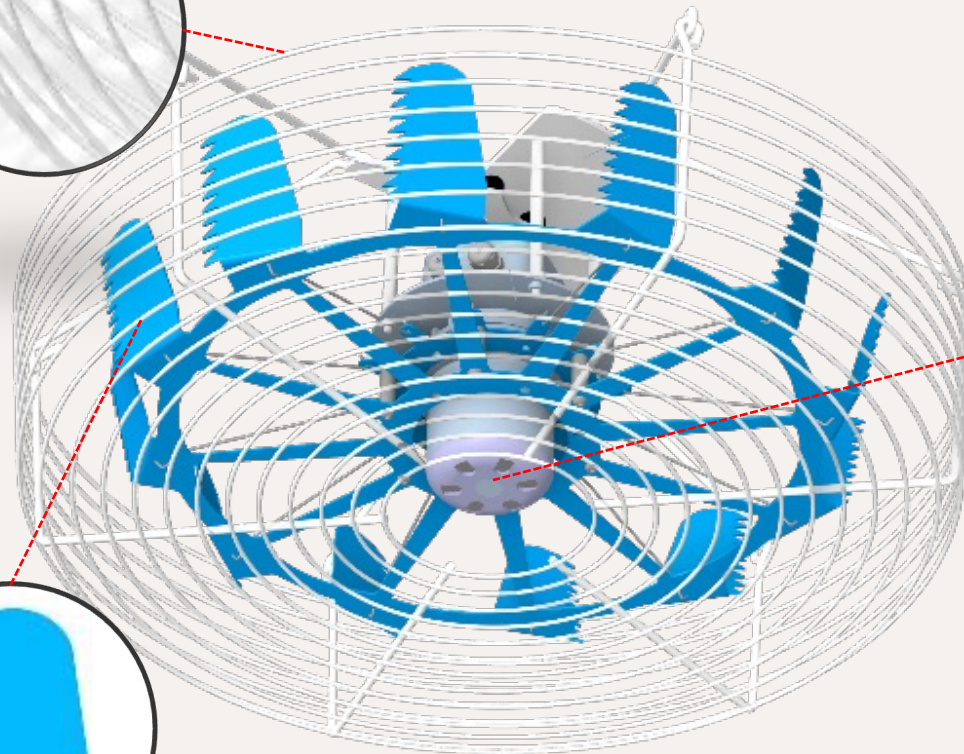
2 versions – EC / AC

Different growing stadia



## The blade

Super quiet  
Wide reach



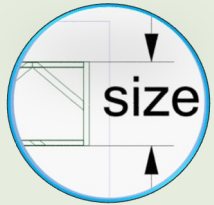


# The layout of the greenhouse defines the number of jets & fans

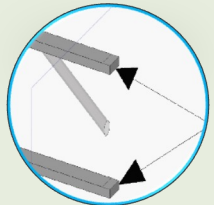
## Essential info



Greenhouse size



Trellis dimensions

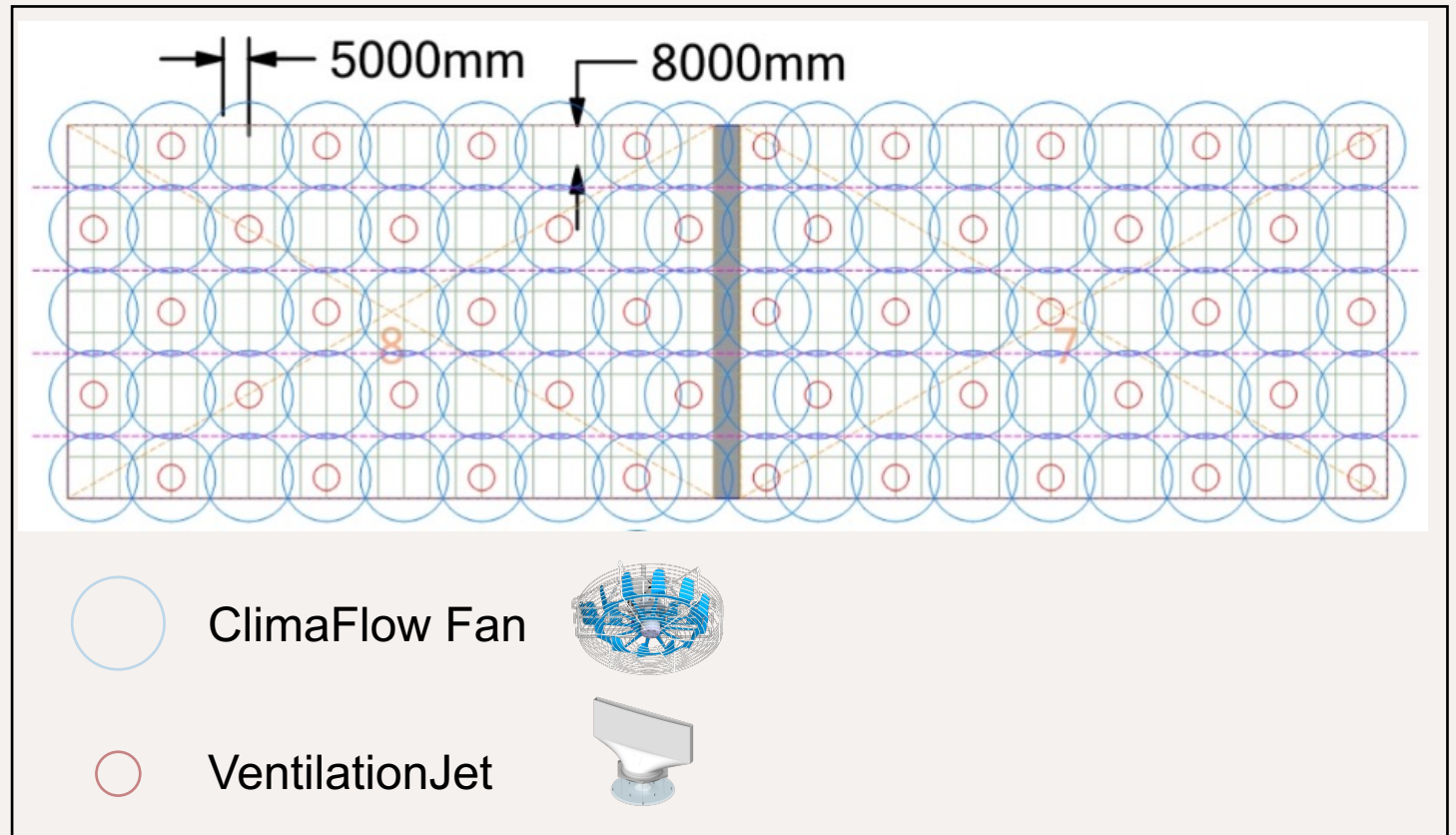


Anything on the trellis

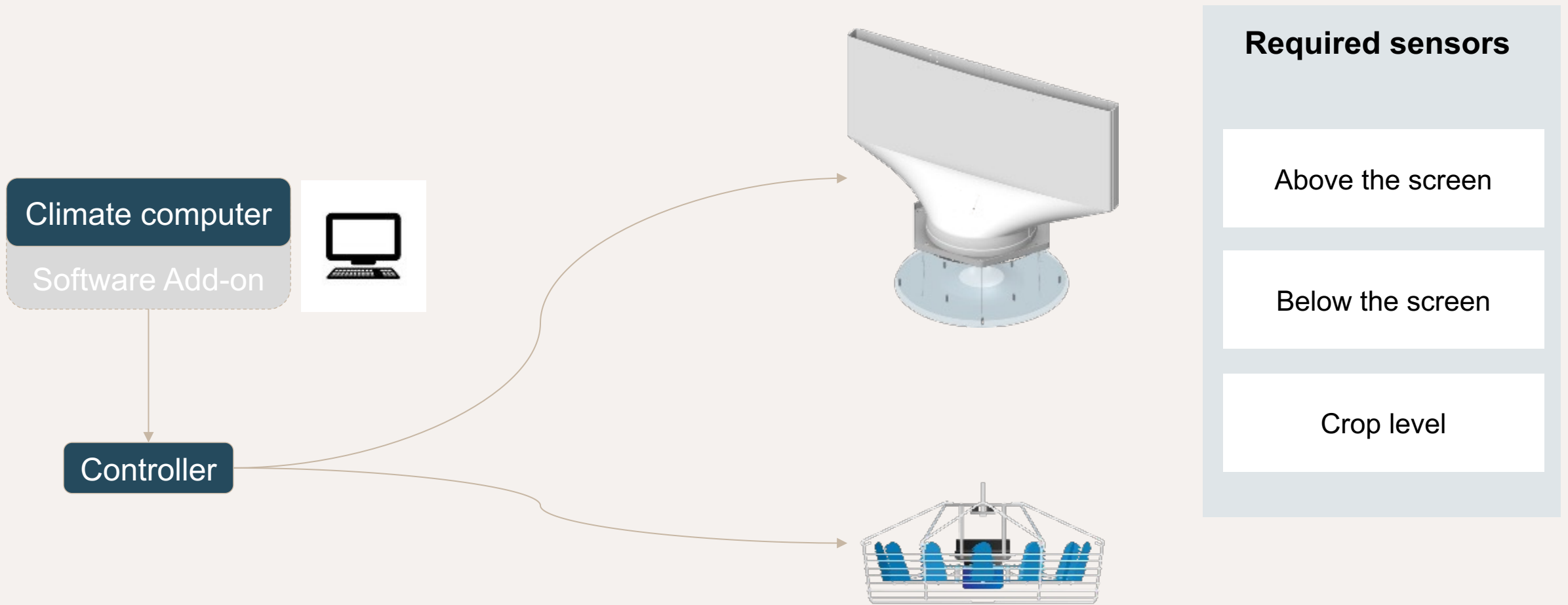


Power connection

## Technical drawing



# How to connect the system to the climate computer



*\*The VentilationJet system works with all the major Climate Computer brands*

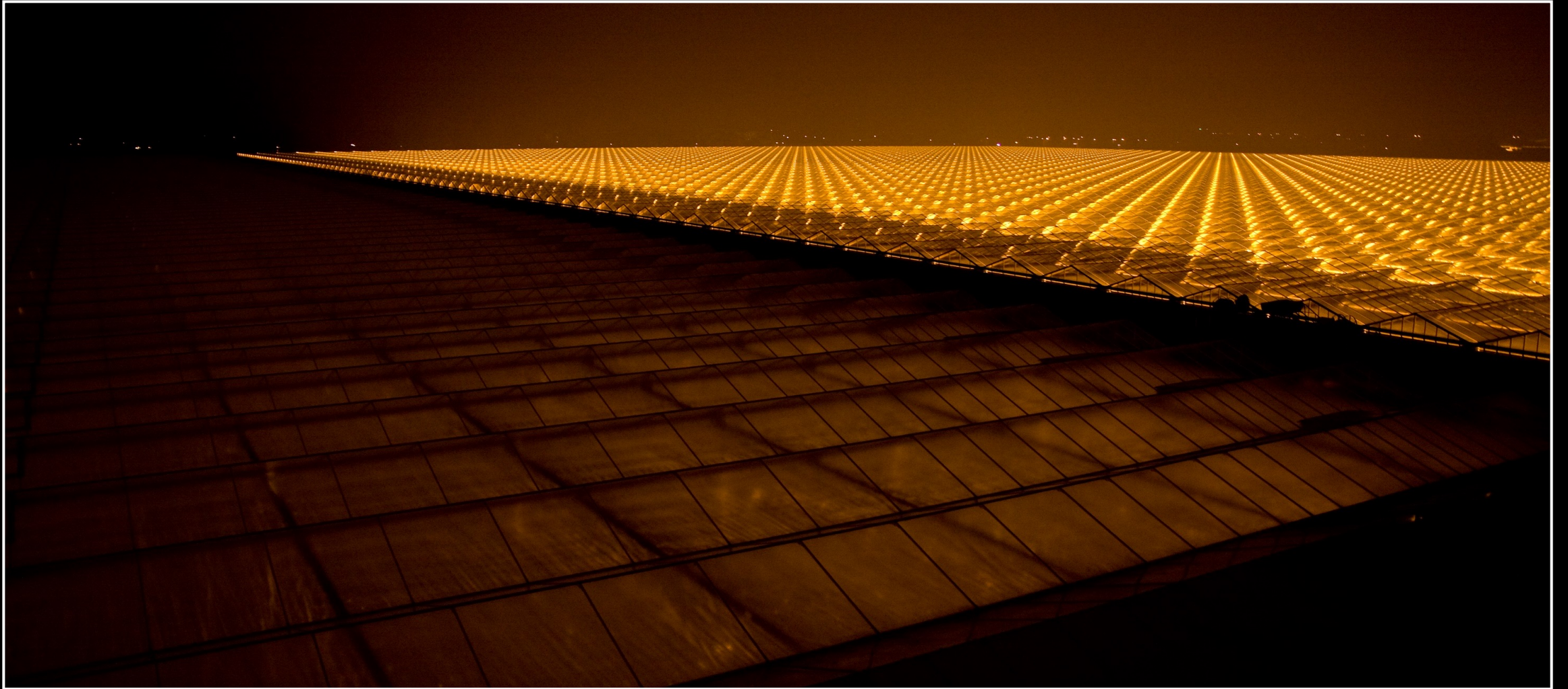












**Thank you for your attention!**



# High Grade Diffuse light affects all three plant balances

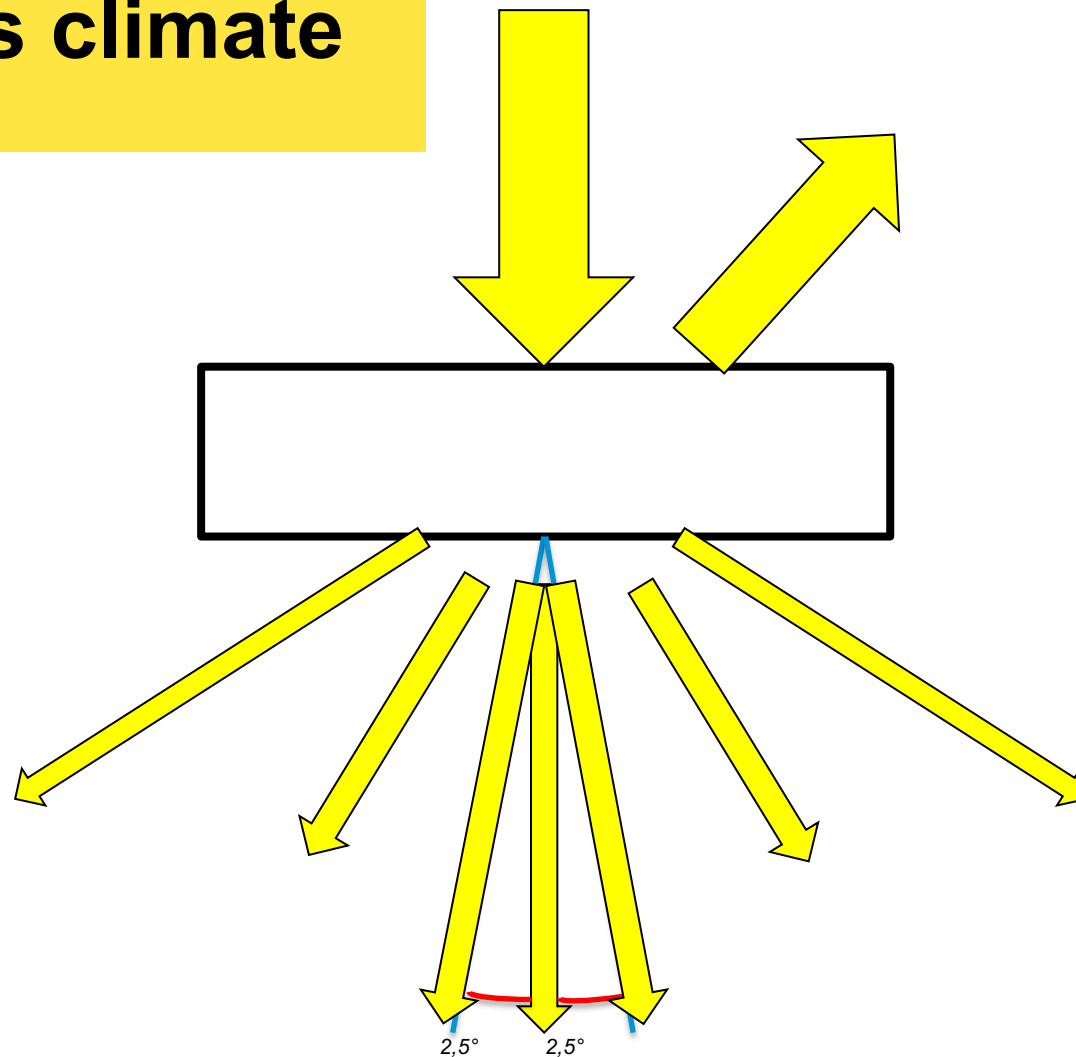




- Summer weather is getting more extreme, a development which will most likely continue
- New types of horticultural glass available, either with single or double AR coating, with higher light transmission
- Growers are getting less fond of coatings and white wash as it is a fixed solution
- Crop replacement moment changes, now even in the peak of summer to create an more even production pattern

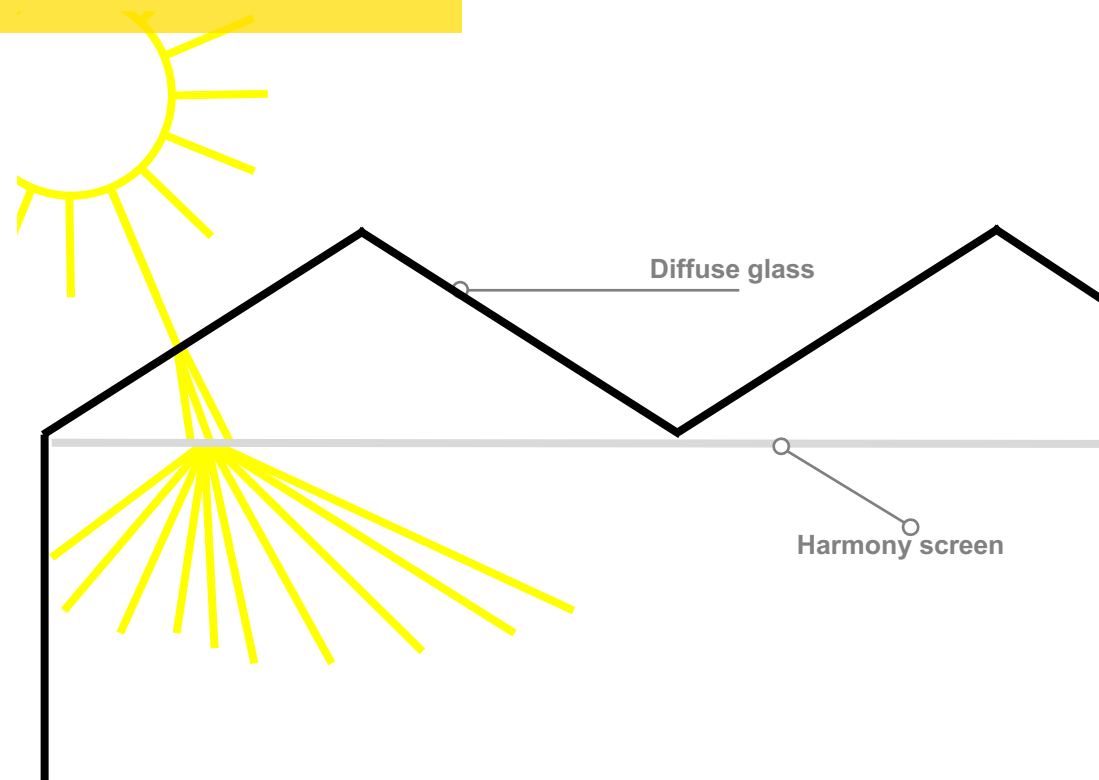


# Homogenous climate

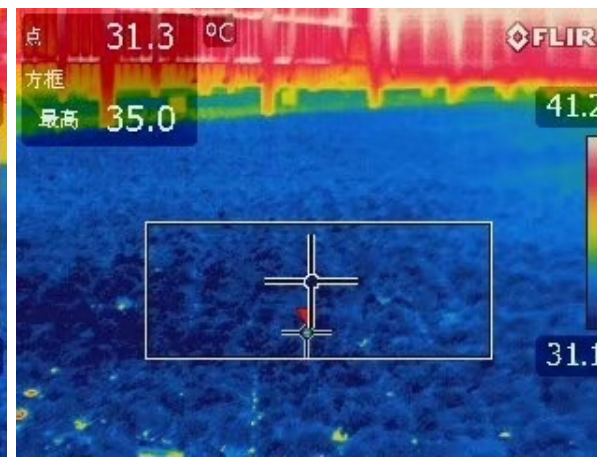
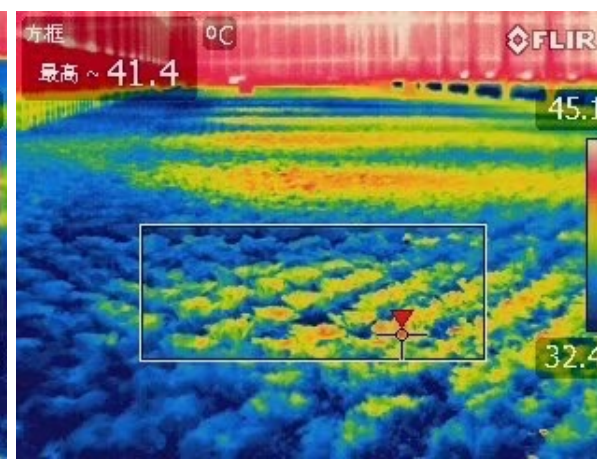
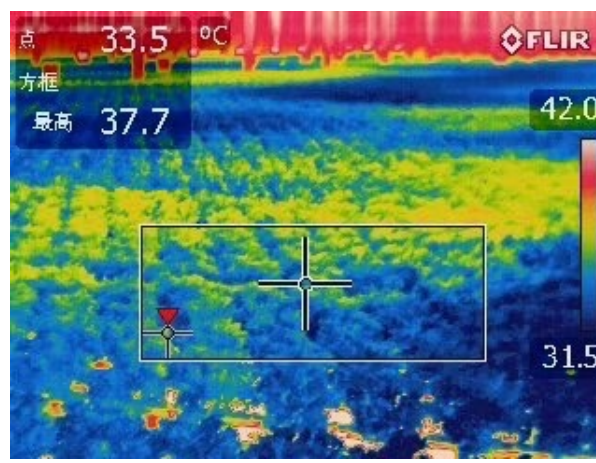




# Homogenous climate

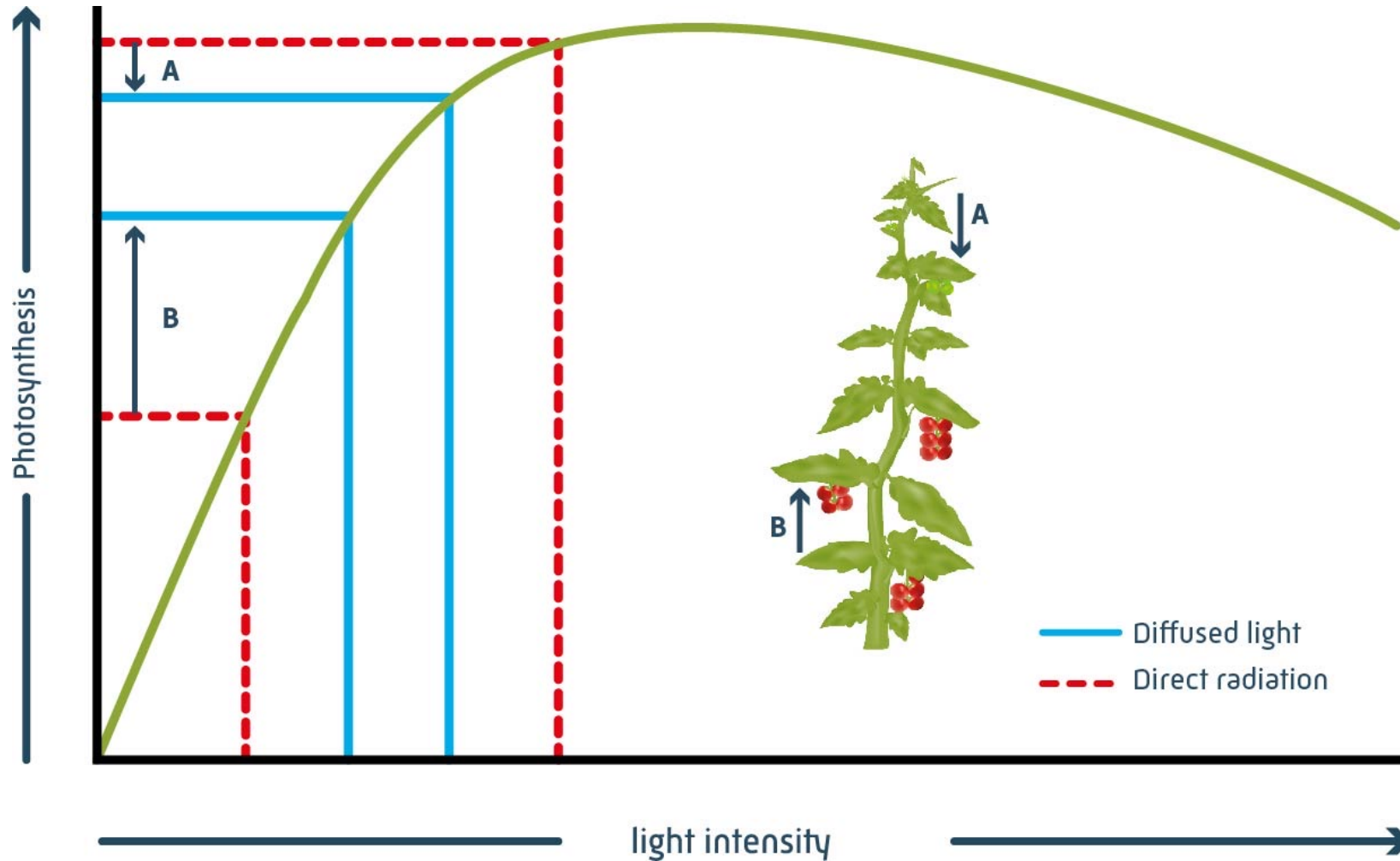


# Homogenous climate





# Homogenous climate



# Homogenous climate

**LOWER**

shading level  
**possible**

spreads light  
even more  
**evenly**

