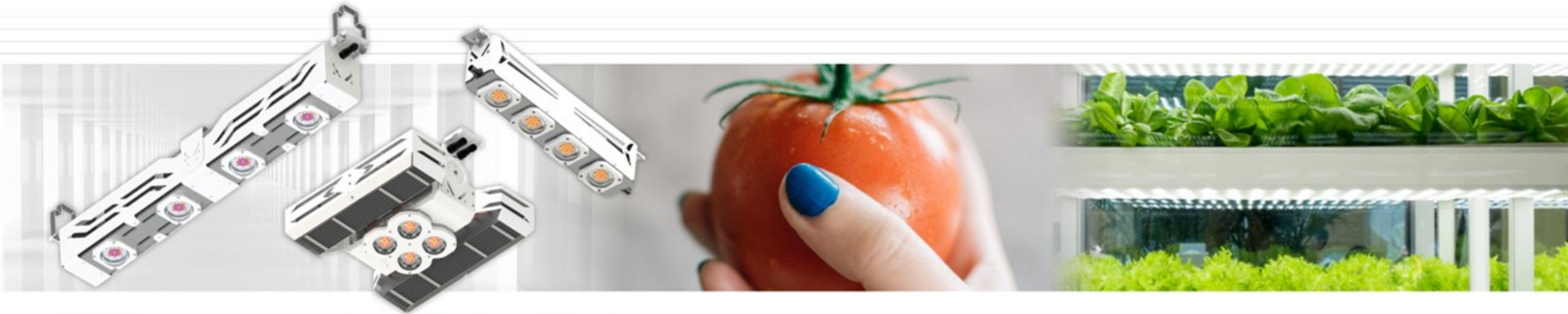


CoolGrow[®] VF

The Growers Platform
for Propagation & Research



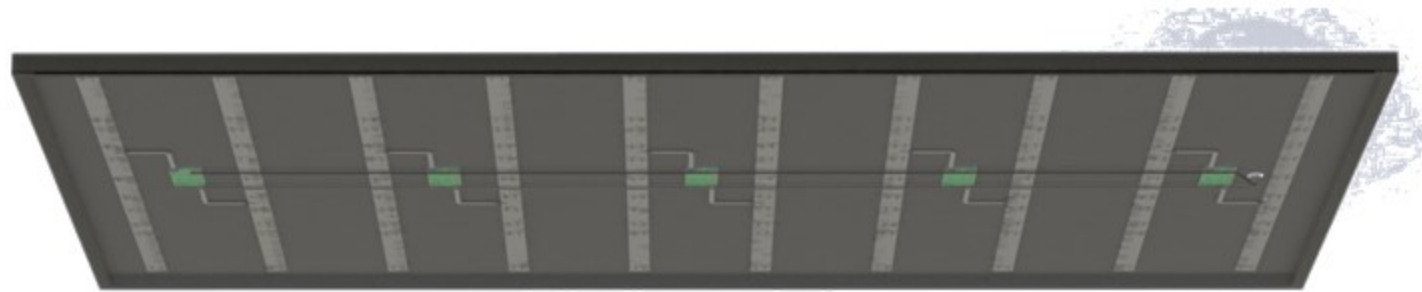
Technology

Grow LED emitters directly embedded in glass panel
4 individual addressable LED channels with
various led spectra

Highest plant penetration rate through hazing technology

30% higher PPFD through reflection technology

Growth spectrum controls through CoolControls®
wireless Bluetooth



Technology

Standard size 750mm x 1200mm - Surface: 0,9 m²

Max size 3500x2500mm

(customizations only for qty>500pcs)

Thickness 24mm

Supply voltage 100-230Vac - Rated power 200W - IP67

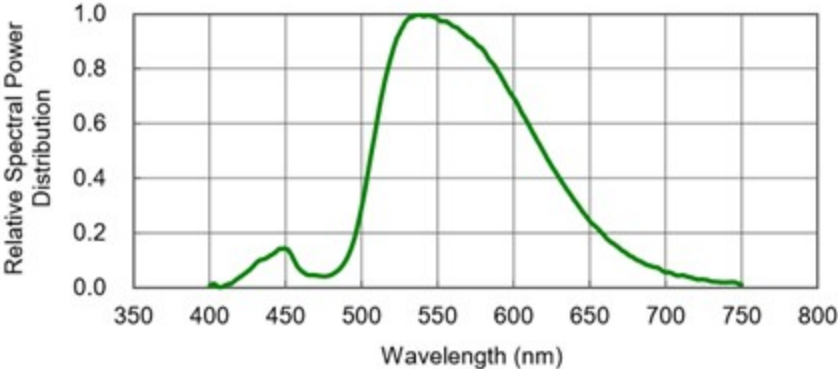
4 channels individual controllable from 0-100%

4 standard light spectra

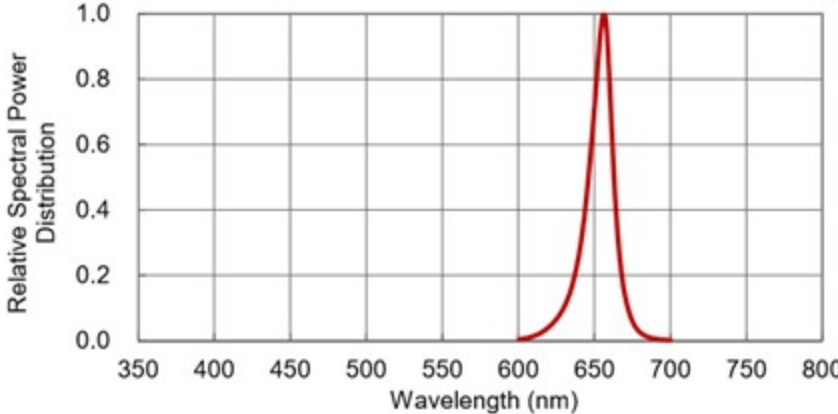


Standard recipe wavelenghts

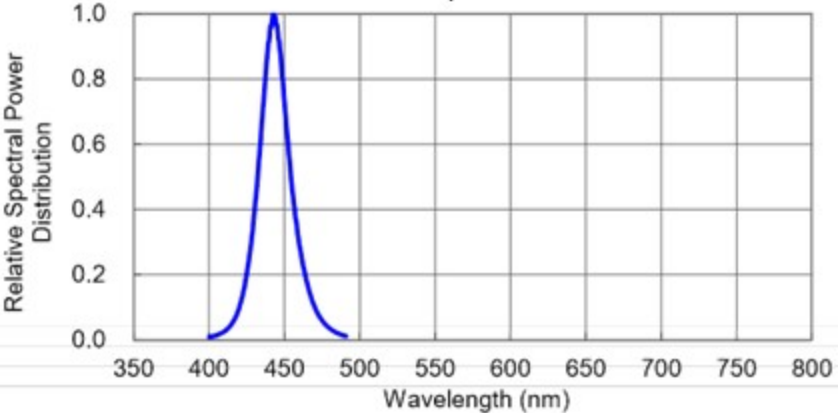
Lime/Green



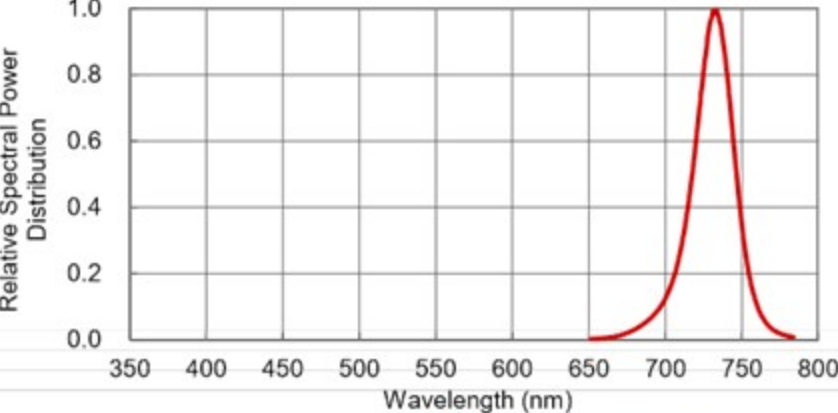
Hyper Red 660nm



Deep Blue 450nm



Far Red 730nm



**THE NEXT DIMENSION IN
LED GROW LIGHTS**



Models

CoolGrow VF RBLFR

- Blue 450nm - $105\mu\text{mol}/\text{sm}^2$
- Red 660nm - $110\mu\text{mol}/\text{sm}^2$
- Far Red 730nm - $85\mu\text{mol}/\text{sm}^2$
- Lime/Green - $70\mu\text{mol}/\text{sm}^2$

CoolGrow VF RRBFR

- Blue 450nm - $105\mu\text{mol}/\text{sm}^2$
- Red 660nm - $220\mu\text{mol}/\text{sm}^2$
- Far Red 730nm - $85\mu\text{mol}/\text{sm}^2$

CoolGrow VF 2RBLFR

- Blue 450nm - $105\mu\text{mol}/\text{sm}^2$
- Red 660nm - $220\mu\text{mol}/\text{sm}^2$
- Far Red 730nm - $85\mu\text{mol}/\text{sm}^2$
- Lime/Green - $70\mu\text{mol}/\text{sm}^2$



Results through Science – The Haze Effect

Direct sun light which falls on crops with a more complex morphology creates a high rate of sun flecks inside the crop, resulting in less contact of the light photons on the biomass

Hazing or diffusing light creates more contact and a deeper crop penetration without affecting light transmission

Dr. [Hemming et al., 2007, 2008, 2014](#)

Dr. [Li et al., 2014a,b](#)



Results through Science – The Haze Effect

Many crops with a more complex morphology in LED vertical farming show similar flecks where light doesn't land on the plant when using LED bars with direct light, resulting in lower photosynthesis rates and variations in morphology



Results through Science – The Haze Effect

By applying a chemical etching 28% haze on the inside of the glass, the direct light beams get diffused and penetrate deeper in the crop – no light loss impact

Besides a deeper crop penetration the glass hazing leads to an improved light uniformity at shorter distance – uniform light distribution from just 5 cm lamp to crop

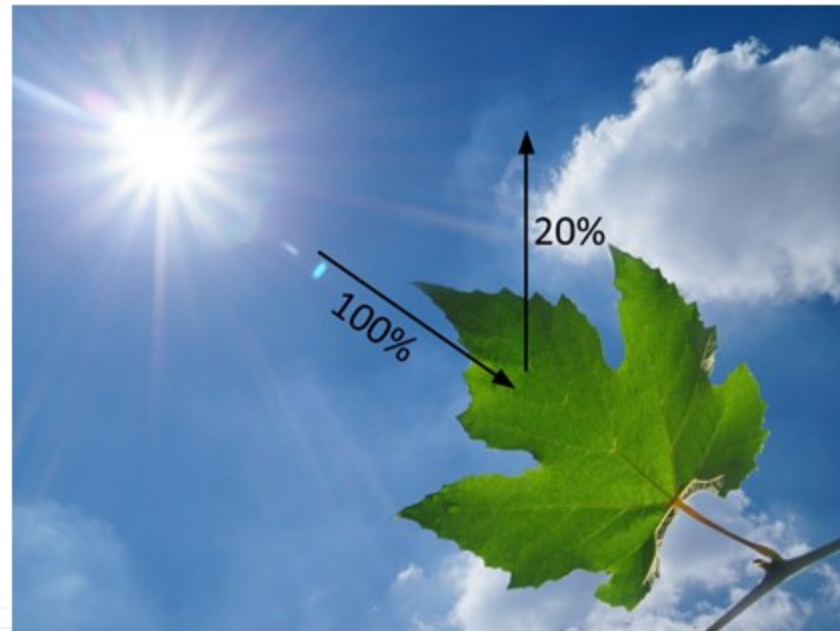


Results through Science – The Reflection Effect

Light which falls on a crop gets partially reflected

Variations from 10% to 20% on single leaf – color & wavelength depending

If you apply a PPFD of $150\mu\text{mol}/\text{sm}^2$, actually the plant only receives $120\mu\text{mol}/\text{sm}^2$



Results through Science – The Reflection Effect

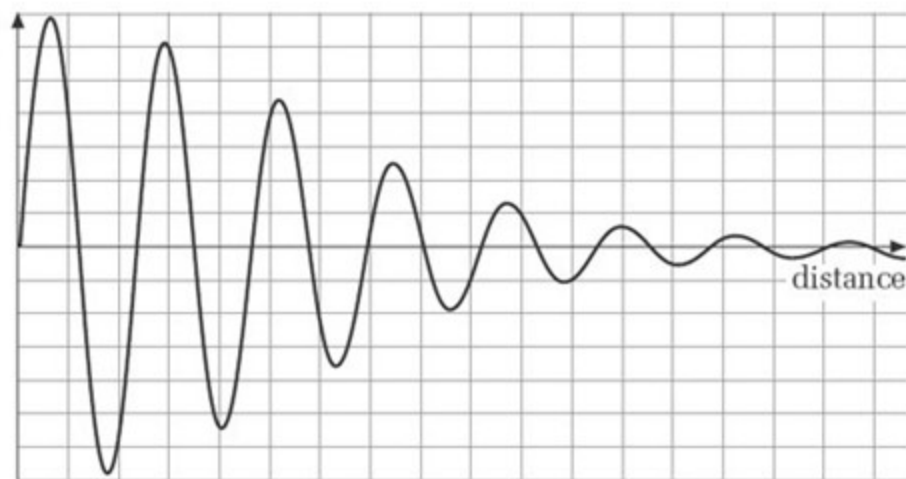
Besides leaf reflection, installations with fix plug distances and young crops have many times enormous open space where photons which land will not contribute to plant growth, so from the $120\mu\text{mol}/\text{sm}^2$ maybe only 30% of all the light photons lead to photosynthesis



Results through Science – The Reflection Effect

By applying a reflective coating over the whole inner surface behind the glass, in combination with using white highly reflective trays and materials in the VF setup, 90% of the energy can be re-reflected towards the crops

The standing wave reflection or SWR magnitudes the total result to 28% gain at full canopy occupation and up to 60% with young crops

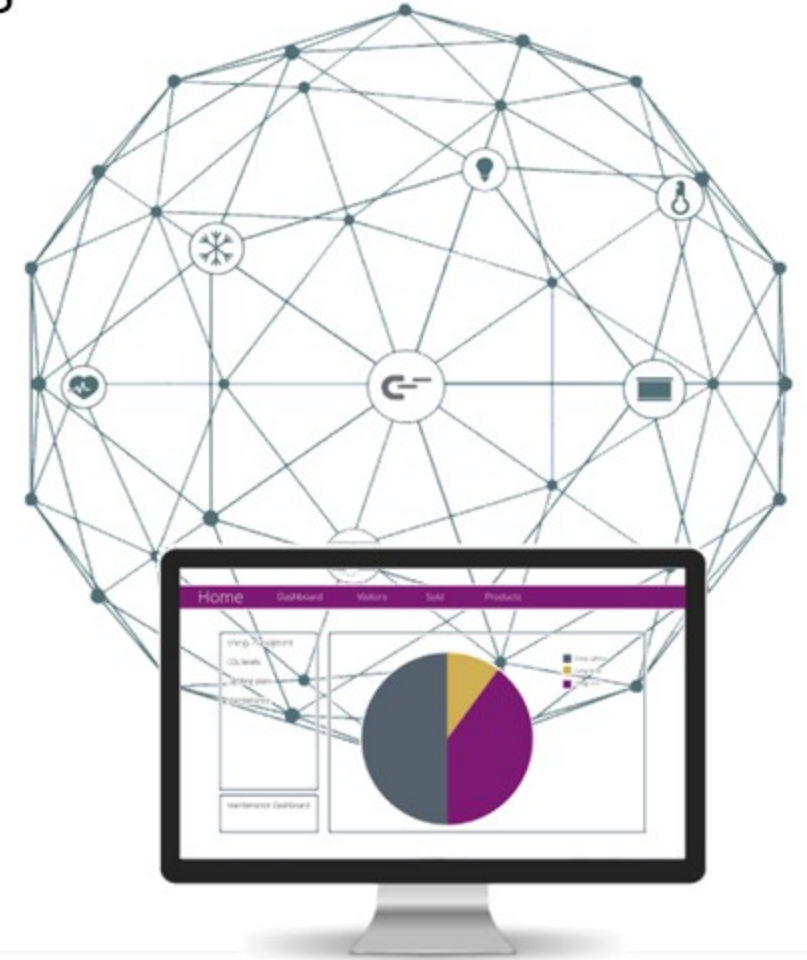


CoolControls® - Bringing IoT to the Growers

Most secured BLO (Bluetooth Low Energy) network

Full redundant and independent operations

Recipe controls with 4 sliders per spectrum channel



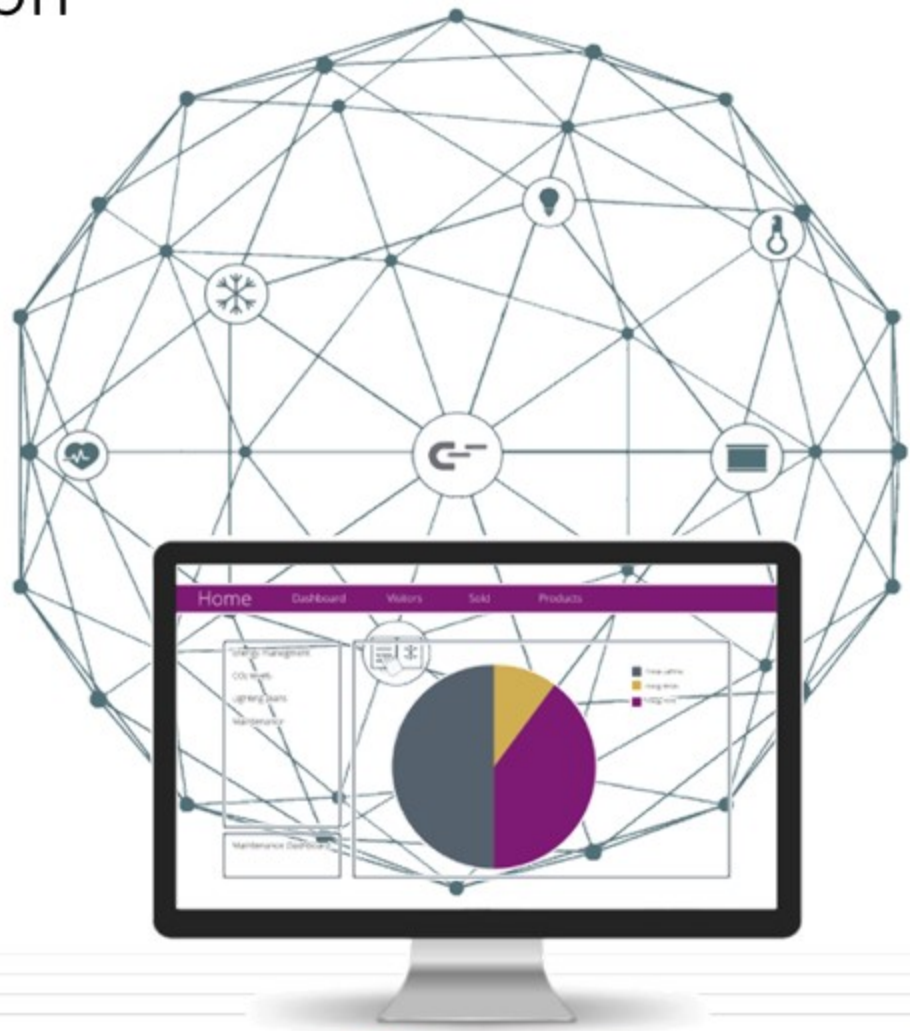
Advanced reporting from June 2019



CoolGrow VF[®] - The Power of Cooperation



**HORTICULTURE
LED GROW LIGHTS**



**THE NEXT DIMENSION IN
LED GROW LIGHTS**

