

Programme

Online Course

Greenhouse Horticulture

2025



Wageningen University & Research

Course leaders:

Full interactive course:

Self-paced:

Dr Silke Hemming & Prof. Dr Leo Marcelis

€ 1.495 - March – May 2025 (yearly)

€ 1.095 - Start anytime (ongoing);

option to add yearly Q&A € 500 (on going)

Lecturers

Tommaso Barbagli MSc	Researcher, Wageningen University & Research, Greenhouse Horticulture Unit
Dr Jouke Campen	International project manager, Wageningen University & Research, Greenhouse Horticulture Unit
Dr Silke Hemming	Team leader Greenhouse Technology, Wageningen University & Research, Greenhouse Horticulture Unit
Dr Ep Heuvelink	Associate professor, Wageningen University & Research, Horticulture & Product Physiology Group
Mexx Holweg MSc	PhD candidate, Wageningen University & Research, Horticulture & Product Physiology
Dr David Katzin	Researcher, Wageningen University & Research, Greenhouse Horticulture Unit
Dr Marjolein Kruidhof	Researcher, Wageningen University & Research, Greenhouse Horticulture Unit
Dr Paul Kusuma	Researcher, Wageningen University & Research, Horticulture & Product Physiology Group
Dr Sharath Malleshaiah	Post-doc Horticulture & Product Physiology Wageningen University & Research
Prof Dr Leo Marcelis	Head of chair group Horticulture & Product Physiology Wageningen University & Research
Prof Dr Gerben Messelink	Special professor Biological Pest Control in Greenhouse Productions Systems Wageningen University & Research
Dr Van Nguyen	Researcher, Wageningen University & Research, Greenhouse Horticulture Unit
Jim Van Ruijven MSc	Team leader Root zone dynamics, Wageningen University & Research, Greenhouse Horticulture Unit
Dr Julian Verdonk	Associate Professor Wageningen University & Research, Horticulture & Product Physiology Group
Dr Feije de Zwart	Senior Scientist, Wageningen University & Research, Greenhouse Horticulture Unit



Course content | Online Course on Greenhouse Horticulture

Module 1 Introduction to Protected Horticulture (2.5 hours)

Global trends and Critical success factors	Leo Marcelis
Introduction to Greenhouses and (sun) radiation	David Katzin

Module 2 Basic principles of Crop physiology (2 hours)

Basic principles of Crop physiology	Ep Heuvelink
<ul style="list-style-type: none">• Growth and development: from light interception to yield• Light Use Efficiency and Potential Yield• Yield component analysis• Plant growth: the role of light	

Module 3 The greenhouse cover: light and temperature (3.5 hours)

Functions of the greenhouse cover	Silke Hemmink
<ul style="list-style-type: none">• Functions of the greenhouse cover & new developments• Light quantity/transmission, diffusion, spectrum, thermal properties	
Energy and humidity control	Feije de Zwart
<ul style="list-style-type: none">• Energy balance and greenhouse temperature: effect of the properties of the properties of the cover• Energy and shading screens• Humidity control	

Module 4 Crop and Root-zone (2 hours)

Water sources and water treatment	Jim van Ruijven
Crop and Root-zone: Fertilization	Paul Kusuma
<ul style="list-style-type: none">• Introduction, Physiology of nutrient uptake• Special case: Calcium uptake and transport in relation to crop growth and greenhouse environment• Water quality EC and pH	

Module 5 Irrigation and fertilization (3.5 hours)

Cultivation systems, growing media and irrigation and feedback	Jim van Ruijven
Nutrient solutions and management	Tommaso Barbagli
<ul style="list-style-type: none">• Chemistry and fertilizer recipes calculation• In practice: EC control, pH control and nutrient control	



Module 6 Potential crop yield (3 hours)

Plant growth	Ep Heuvelink
<ul style="list-style-type: none">• The role of drought and salinity• The role of temperature, CO₂ and humidity• Biomass partitioning based on relative sink strength	

Module 7 Lighting in protected cultivation (2 hours)

Lighting in protected cultivation	Leo Marcelis
Cultivation and physiology of medicinal cannabis	Mexx Holweg
Lighting to control flowering	Sharath Malleshaiah

Module 8 Crop protection and Integrated Pest Management (IPM) (2.5 hours)

<ul style="list-style-type: none">• Introduction to ecologically-based IPM• Overview of important pest species• Introduction to biological control and important groups of natural enemies• Biological control strategies• Cultural control strategies• Integration of different measures into an ecologically-based IPM strategy	Marjolein Kruidhof and Gerben Messelink
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Module 9 Post Harvest Physiology and Technology (1 hour)

Post-harvest product quality management to predict and prevent quality loss	Julian Verdonk
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Module 10 Greenhouse climate management (2 hours)

Greenhouse climate management	
<ul style="list-style-type: none">• Greenhouse climate control, ventilation and temperature management• Humidity and Carbon dioxide management	Jouke Campen
<ul style="list-style-type: none">• Economy and sustainability of optimal climate management	Silke Hemming

What's next

<ul style="list-style-type: none">• Summer School Greenhouse Horticulture – the full experience• Vertical Farming, mixed classroom with master students• Masterclass Soilless Culture @ Bleiswijk research facility• Fresh Food Quality, on campus course• Summer School Image Analysis for Plant Phenotyping	
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Live Online Q&A sessions in Full Interactive course

February 15th 2025 – July 30th 2025

Q&A schedule: each session will start at 2 PM Amsterdam time zone and will be scheduled for at least one hour and a maximum of two hours (dependent of the number of participants).

Module and Topic	Preliminary Dates 2025	Experts
1. Introduction to Protected Horticulture	Thursday 6 March	Leo Marcelis and David Katzin
2. Basic principles of Crop physiology	Thursday 13 March	Ep Heuvelink
3. The greenhouse cover: light and temperature	Thursday 20 March	Silke Hemming and Feije de Zwart
4. Crop and Root-zone	Thursday 27 March	Jim van Ruijven and Paul Kusuma
5. Irrigation and fertilization	Thursday 3 April	Jim van Ruijven and Tommaso Barbagli
6. Potential crop yield	Thursday 10 April	Ep Heuvelink
7. Lighting in protected cultivation	Thursday 17 April	Leo Marcelis, Paul Kusuma and Sharath Malleshaiah
8. Crop protection and Integrated Pest Management (IPM)	Thursday 24 April	Marjolein Kruidhof and Gerben Messelin
9. Post Harvest Physiology and Technology	Thursday 8 May	Julian Verdonk
10. Greenhouse Climate Management	Thursday 15 May	Jouke Campen and Silke Hemming

Please note these dates are **preliminary** dates.

Duration of the Live Online Q&A session:

- upto 10 participants: 1 hour
- upto 15 participants: 1.5 hours
- 16 participants and more: 2 hours