GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN IN PUBLICA COMMODA SEIT 1737

Core module

'Molecular cell biology of plant–microbe interactions and stress adaptation'

M.Bio.104

Prof. Lipka

Dr. Pierdzig

Dr. Thurow

Dr. Spallek

Prof. Balazadeh

Priyanka Chopra

Tobias Staacke

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Schwann-Schleiden-Center of Molecular Cell Biology (SSF)

Julia-Lermontowa-Weg 3 - Nordcampus

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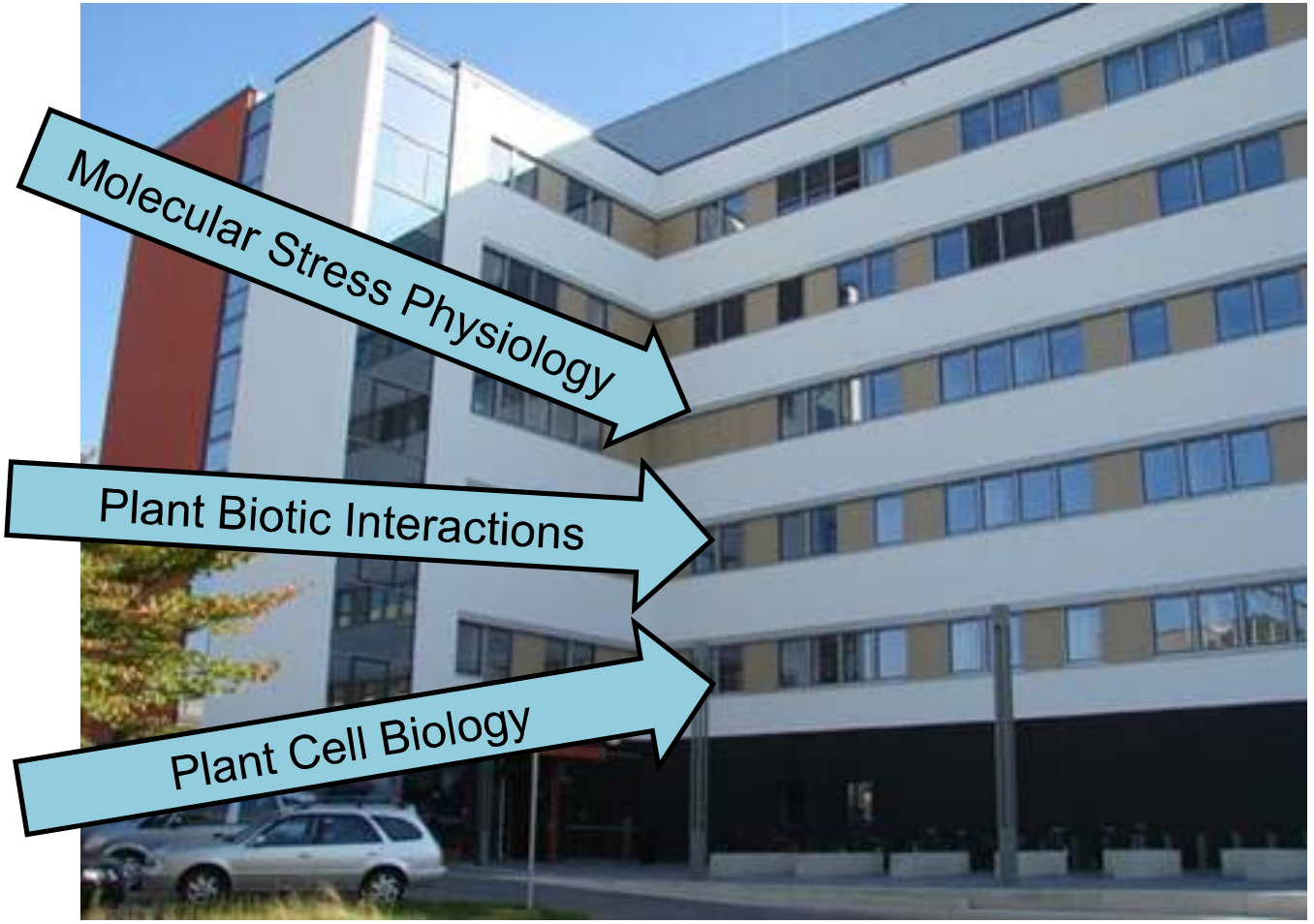
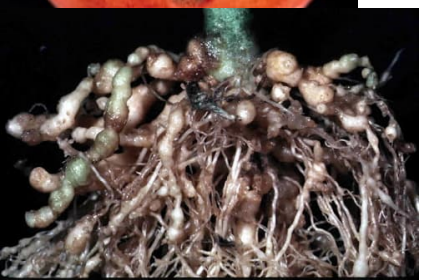
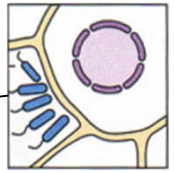
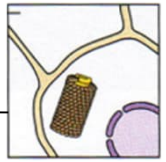
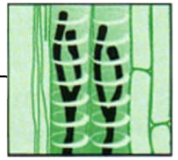


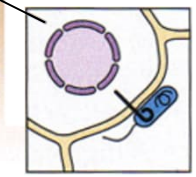
Plants face many microbial pathogens

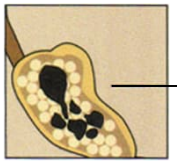


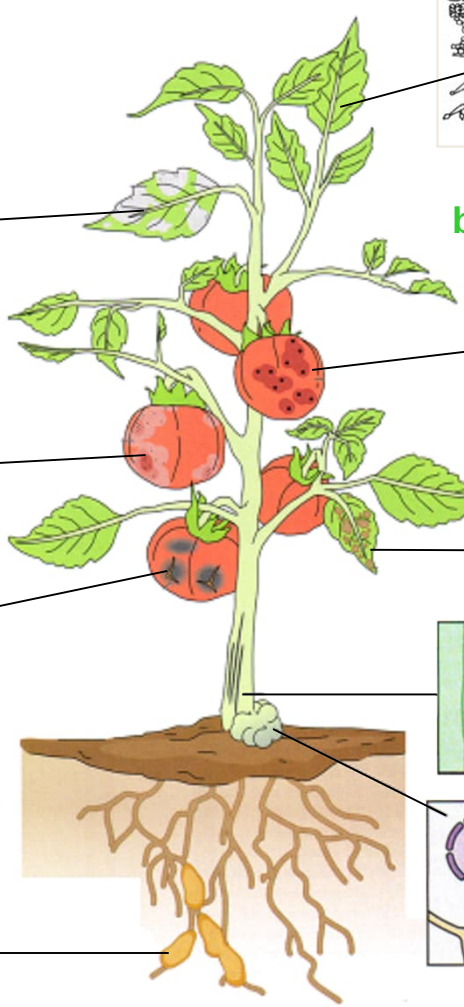








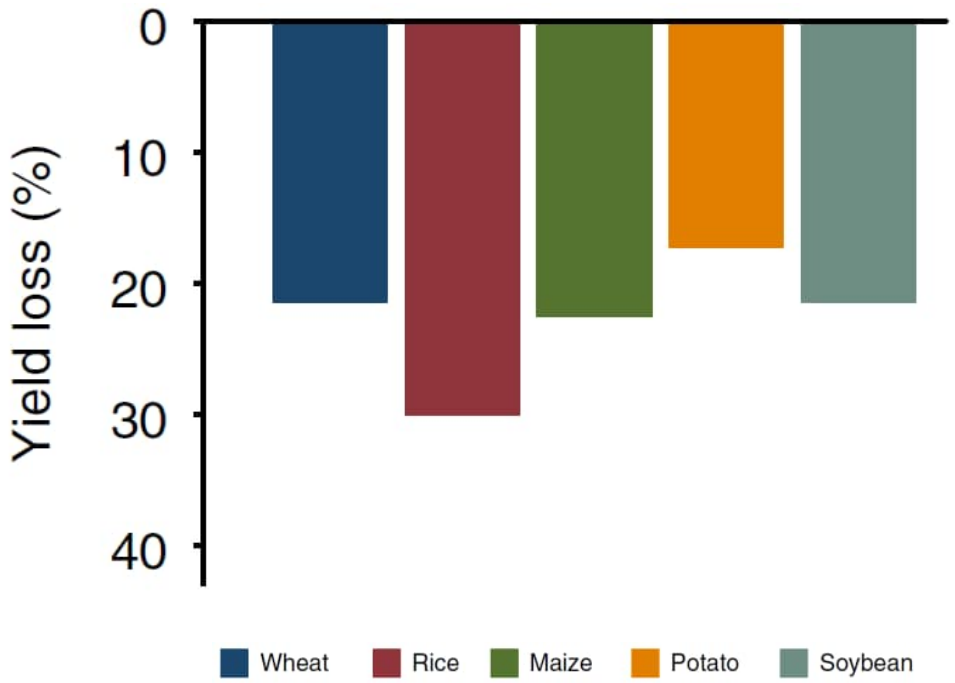




ARTICLES
https://doi.org/10.1038/s41559-018-0793-y
nature ecology & evolution

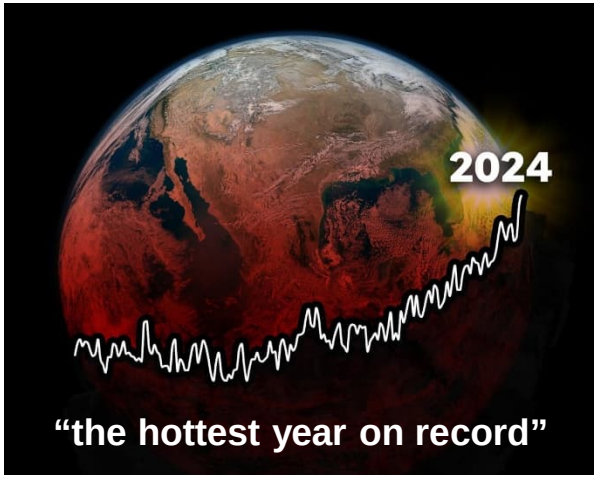
The global burden of pathogens and pests on major food crops

Global yield loss due to plant pathogens:

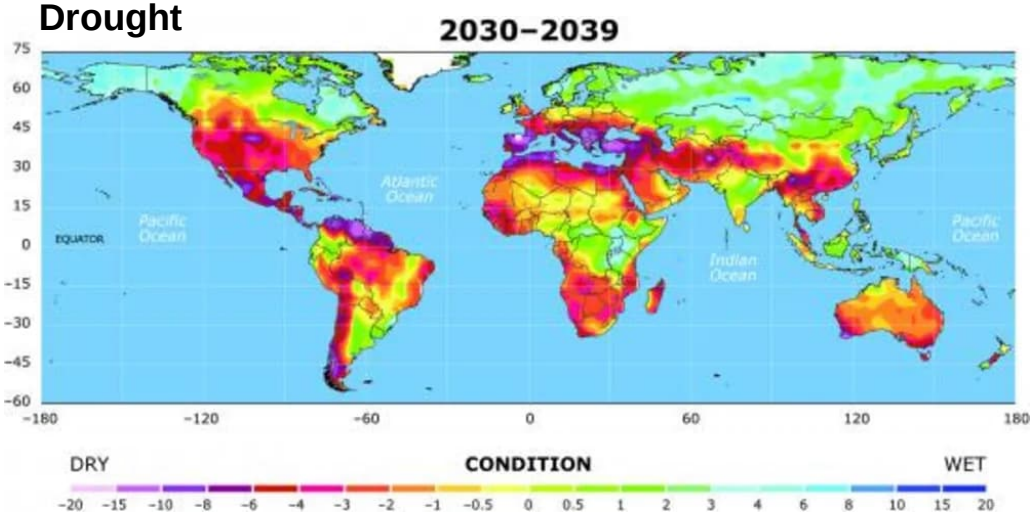


Savary *et al.*, 2019

Climate change-associated abiotic stress exascerbates the problem …

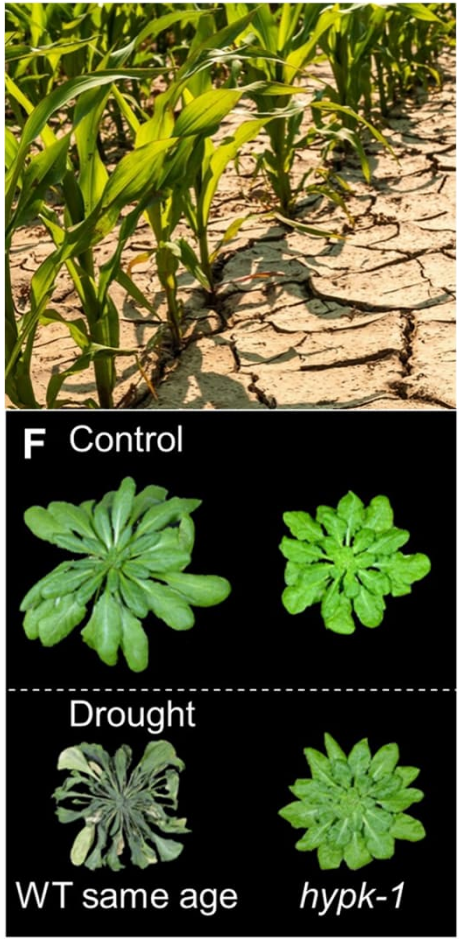


Drought

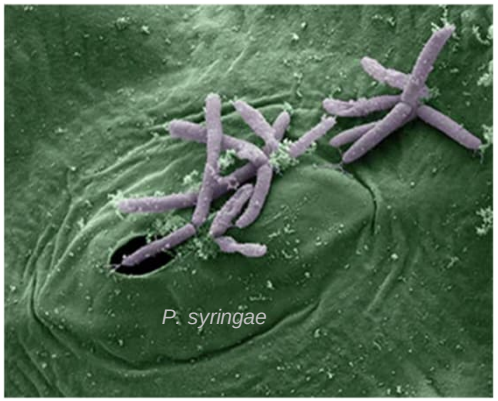


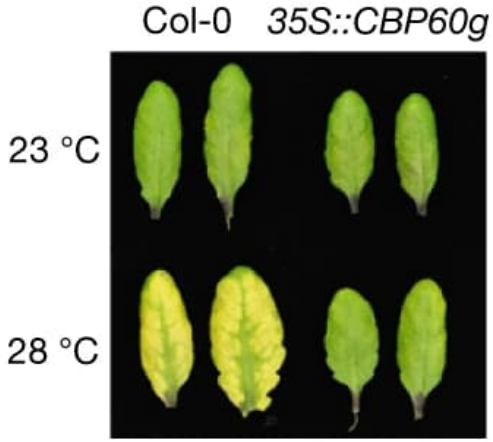
https://www.nbcnews.com/id/wbna39741525

… but molecular plant research can help to generate pest- and climate-resilient plants



Miklánková et al., Science Advances 2022





Kim et al., Nature 2022

Intriguingly, microbes can even help plants to cope with abiotic stress !

Arabidopsis (Col-0)

control
watered

+ *Verticillium* fungus
(21 dpi)
watered

control
drought
(14 d)

+ *Verticillium* fungus
(21 dpi)
drought
(14 d)

Reusche et al., Plant Cell 2012

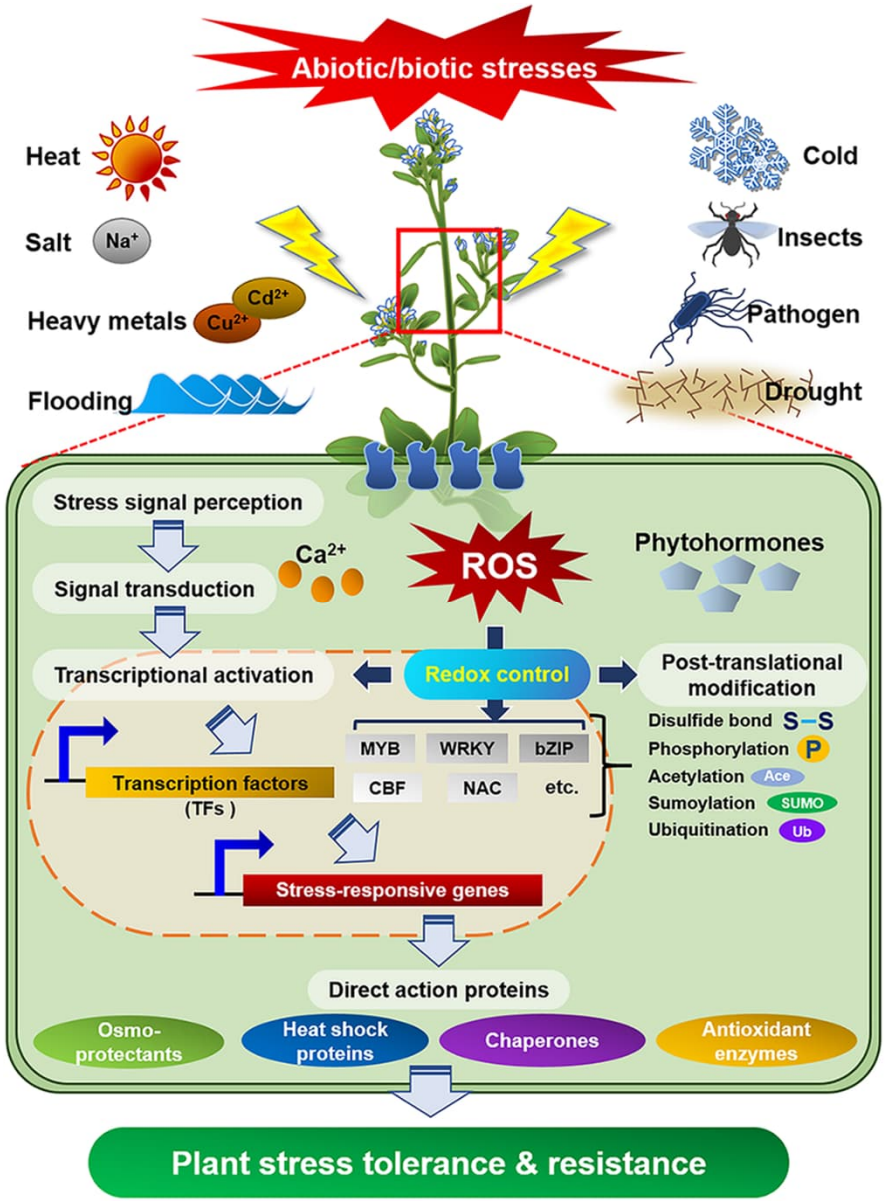
Plants have the capacity to establish stress memory

severe heat stress:

Thermopriming (moderate HS)

Understanding molecular mechanisms helps generate plants with enhanced stress memory

A molecular understanding of plant defence to both, abiotic and biotic stress is mandatory !



DOI: 10.5772/intechopen.102995

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'Cell & Molecular Biology of Plant-Microbe Interactions'

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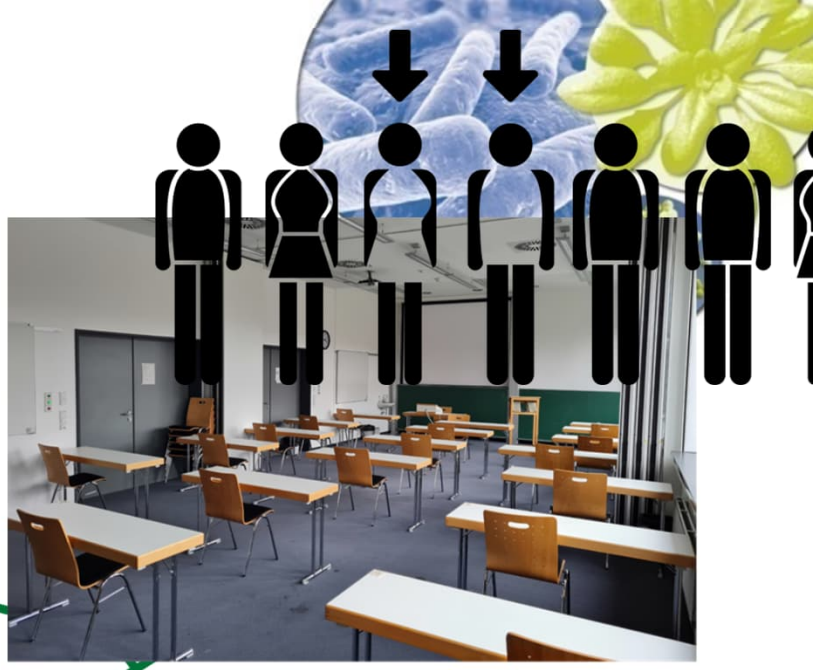
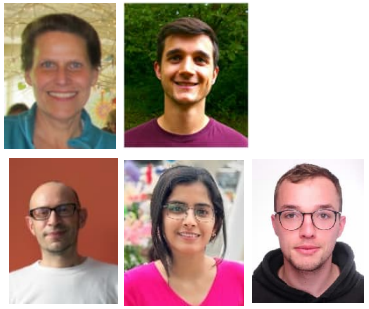
Graphics: The Noun Project

Lectures
(SSF -1.101)

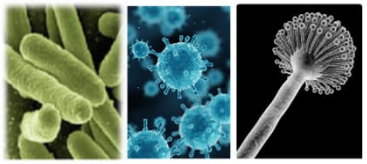


Literature seminars
(SSF -1.101)



Practical Methods Course (SSF 0.103 + 2.101)


Key feature of lecture, seminar and practical course:
departmental research-related topics and methods



Biotic stress

fungi bacteria parasitic plants host plants

pathogen lifestyles (interaction) model systems

preformed & induced defence

MAMPs chitin flagellin teichoic acids

cell-surface receptors effectors cytosolic receptors

diversity & evolution structure & function

signaling & executive defence mechanisms PTMs transport processes

host defence suppression (developmental) reprogramming of hosts

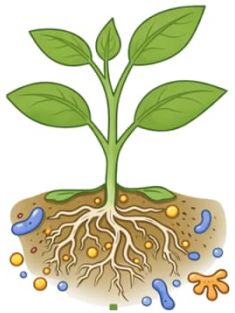
hormone-dependent signaling mRNA turnover cell death

pathogen infections MAMP purification ConA pulldowns

ROS assays ion leakage assay (confocal) microscopy

protein expression, isolation & detection protoplast & cell culture assays

Key feature of lecture, seminar and practical course:
departmental research-related topics and methods



Abiotic stresses (drought & heat)

Plants

Stress responses

Stress memory

Beneficial microbes

Stress priming

Hormonal signaling (ABA, ethylene)

Transcription factors

Gene regulatory networks (GRNs)

Chromatin Immunoprecipitation (ChIP)

ROS signaling

Promoter analysis

Chromatin marks

Antioxidants

Electrophoretic gel shift mobility assay (EMSA)

Stomata

Osmoprotectants

Yeast one-hybrid

qRT-PCR/ RNA-seq

HSPs

Leaf water content

Protein interactions

Root system architecture

Yeast two-hybrid

Proximity ligation assay

Bimolecular fluorescence complementation (BiFC)

What we also offer...

Begin:

Monday, April 13th at 10:15 in the seminar room SSF 0.101

Practical Methods Course
(SSF 0.103 + 2.101)

Dates and Times:

SoSe 26				
	lecture (Tuesday, 8.15-9.45)	**lecture / seminar** (Wednesday, 8.15-9.45)		**Practical Course** Mon.-Fri., 10.15 - 18.00
week 1 (Monday, 13.4.)	Lecture: *Agrobacterium* - a useful plant pathogen	**How to read and present a paper?**	Seminar	week I (13.4. - 17.4.)
week 2 (Monday, 20.4.)	Basic concepts of Plant-Microbe Interaction Biology / Interaction model systems I	Lecture: Interaction model systems II	Lecture	week II (20.4. - 24.4.)
week 3 (Monday, 27.4.)	Interaction model systems III / Preformed defence mechanisms	**Seminar I**	Seminar	week III (27.4. - 1.5.)
week 4 (Monday, 4.5.)	Induced defence mechanisms / PAMP-triggered immunity	**Seminar II**	Seminar	(week IV) reserve
week 5 (Monday, 11.5.)	Resistance to biotrophs; SA signalling; systemic acquired resistance	**Seminar III**	Seminar	
week 6 (Monday, 18.5.)	Microbial effectors	lecture on own work / **Seminar IV**	Lecture / seminar	
week 7 (Monday, 25.5., pentecost!	Effector triggered immunity	**Seminar IV / V**	Seminar	
week 8 (Monday, 1.6.)	Parasitic plants (incl. own work)	**Seminar V / VI**	Seminar	
week 9 (Monday, 8.6.)	Plant responses to drought and heat, from physiology to adaptations	**Seminar VI / VII**	Seminar	
week 10 (Monday, 15.6.)	ROS and hormonal signaling in plant stress responses	**Seminar VII / VIII**	Seminar	
week 11 (Monday, 22.6.)	Stress priming and stress memory in plants	**Seminar VIII / IX**	Seminar	
week 12 (Monday, 29.6.)	Transcription factors in stress responses-methods to study GRN	Seminar IX	Seminar	
week 13 (Monday, 6.7.)	Plant-beneficial microbe interactions & environment I	lecture on own work	lecture	
week 14 (Monday, 13.7.)	Plant-beneficial microbe interactions & environment II		lecture	
1st week sem. holidays	written exam: 9.15-10:45 (-1.101/-1.102, SSFZ)			
later sem. holidays	written repeat exam: 9.15 -10.45 (MN06, Mikrobiologie)			

Prof. Dr. Lipka
Dr. Spallek / N.N.
Prof. Dr. Balazadeh

Contacts:

Prof. Dr. Lipka: vlipka@gwdg.de
Dr. Spallek: thomas.spallek@uni-goettingen.de
Prof. Dr. Balazadeh salma.balazadeh@uni-goettingen.de