



**HAL**  
open science

## Characterization of molecular mechanisms underlying the multi-drug-resistant phenotypes of *Mycosphaerella graminicola* field isolates

Selim Omrane, Anne Sophie A. S. Walker, Hind Sghyer, Catherine Lanen, Lamia Ouini, Gert Kema, Sabine, Helma Fillinger-David

### ► To cite this version:

Selim Omrane, Anne Sophie A. S. Walker, Hind Sghyer, Catherine Lanen, Lamia Ouini, et al.. Characterization of molecular mechanisms underlying the multi-drug-resistant phenotypes of *Mycosphaerella graminicola* field isolates. Proceedings of the 17th International Reinhardsbrunn symposium on Modern Fungicides and Antifungal Compounds., Apr 2013, Friedrichroda, Germany. hal-01189688

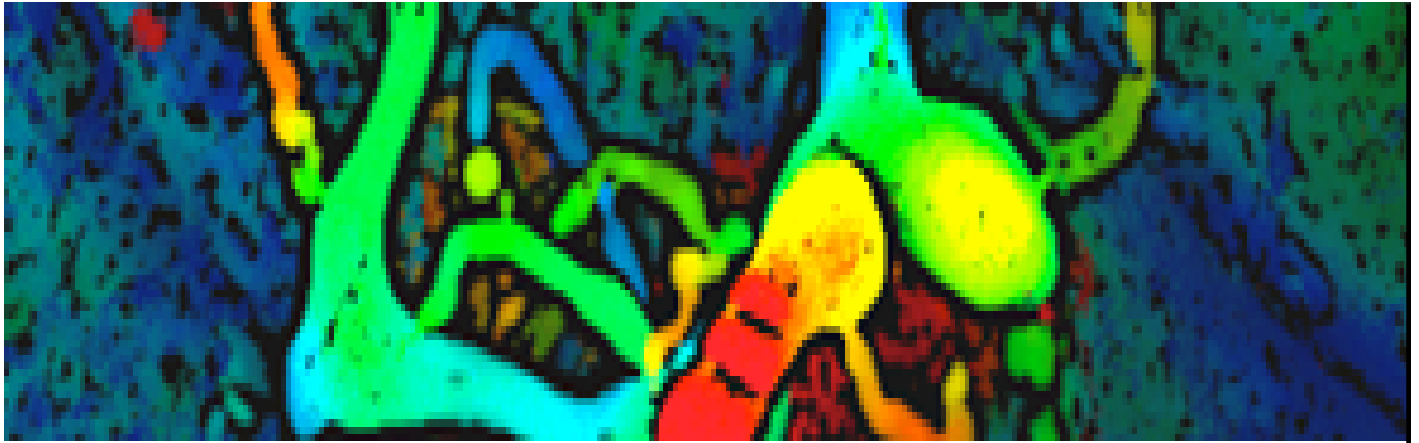
**HAL Id: hal-01189688**

**<https://hal.science/hal-01189688v1>**

Submitted on 3 Jun 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



**17<sup>th</sup> International  
Reinhardtsbrunn Symposium**  
on  
Modern Fungicides and  
Antifungal Compounds

**Scientific Program**

Sunday, April 21<sup>st</sup>

16:00-19:30 Registration

20:00-22:00 Welcome Reception

Ramada-Hotel, Friedrichroda

April 21<sup>st</sup> –April 25<sup>th</sup>, 2013

Monday, April 22, 2013

08:30	Opening - Prof. Dr. Heinz-Wilhelm Dehne	
-------	---	--

**Introduction Lectures** - Chair: Prof. Holger Deising

08:40	Prof. Michael Shaw University of Reading, UK	<i>Keynote:</i> Changing priorities in crop disease management
09:10	Prof. James Adaskaveg University of Riverside, USA	<i>Keynote:</i> Improving distribution of fruits and vegetables by postharvest decay control using new 'reduced-risk' fungicides
09:40	Dr. Pete Berry ADAS Ltd, UK	<i>Keynote:</i> Ecological benefits of fungicides
10:10	Dr. Frank Sauer Lanxess, D	<i>Keynote:</i> Industrial use of fungicides
10:40	Coffee	

**New Technologies and Applications** - Chair: Dr. Bart Fraaije

11:00	Prof. Holger Deising University of Halle, D	<i>Keynote:</i> Discovery of candidate genes for defeating fungal pathogens by host-induced gene silencing (HIGS)
11:30	Dr. P. Schweizer IPK, Gatersleben, D	<i>Keynote:</i> RNAi Technology for durable resistance of crop plants to fungal pathogens
12:00	Mrs. Aline Koch University of Gießen, D	HIGS for the control of agronomical important fungal plant pathogens
12:20	Mr. Carlos Berdugo University of Bonn, D	Non-invasive sensor for screening effects of fungicides on plant senescence
12:40	Lunch	

**New Modes of Action and Fungicides** - Chair: Dr. Dietrich Hermann

14:00	Mr. James Sweigard DuPont Crop Protection, USA	Discovery of the target site of isoxazoline fungicides
14:20	Dr. Adele Salamone CRA-SFM, IT	Efficacy of the fungicide valiphenal against crown rot of rose caused by <i>Phytophthora citrophthora</i>
14:40	Dr. Friedrich Kerz-Möhlendick Bayer CropScience AG, D	Penflufen: The innovative fungicide for seed treatment uses in broad-acre crops
15:00	Mr. Eric Guicherit Syngenta Crop Protection, CH	Solatenol™, the second generation benzonorbornene SDHI carboxamide with outstanding performance against cereal diseases
15:20	Mr. Jonathan Cray Queen's University Belfast, UK	Chaotropic & hydrophobic stress-mechanisms of antifungal substances
15:40	Dr. Christoph Braun Bayer CropScience AG, D	Trigger off endogenous plant defences by isotianil, a new resistance inducer
16:00	Coffee	
16:20-18:00	<b>Poster Demonstration I</b>	-New Modes of Action and Fungicides -New Technologies and Applications -Resistance Risk Assessment -Complex II Inhibitors - Mode of Action and Resistance -Fungicide Resistance - Molecular Aspects, Diagnostics and Genetics

Tuesday, April 23, 2013

**Fungicide Resistance - Molecular Aspects, Diagnostics and Genetics** - Chair: Prof. Ulrich Gisi

08:30	Dr. Andreas Mosbach Syngenta Crop Protection, CH	Approaches to decipher fungicide resistance mechanisms against new active ingredients in the plant pathogenic fungus <i>Botrytis cinerea</i>
08:50	Dr. Nichola Hawkins Rothamsted Research, UK	The role of multiple cyp51 paralogues in intrinsic and acquired azole sensitivity differences
09:10	Dr. Hans Cools Rothamsted Research, UK	Impact of cyp51 changes associated with azole resistance in fungal pathogens of arable crops
09:30	Mrs. Carolina Buitrago Syngenta Crop Protection, CH	An update of the genetic changes in the cytochrome p450 sterol 14-demethylase gene (cyp51) of <i>Mycosphaerella graminicola</i> and their relationship with the DMI fungicides sensitivity
09:50	Dr. Sabine Fillinger INRA, F	Characterization of molecular mechanisms underlying the multi-drug-resistant phenotypes of <i>Mycosphaerella graminicola</i> field isolates
10:10	Coffee	
10:30	Dr. Stefan Wirsal University of Halle, D	Contribution of abc transporters to azole resistance and virulence in <i>Fusarium graminearum</i>
10:50	Mrs. Helena Schmitz University of Hohenheim, D	Sensitivity of <i>Phakopsora pachyrhizi</i> to fungicides and analysis of corresponding resistance mechanisms
11:10	Mrs. Madeline Tucker ACNFP, Curtin University, AUS	The impact of recently emerged mutations in cyp51 in <i>Blumeria graminis</i> f. sp. <i>hordei</i> isolates in western Australia
11:30	Mr. Pablo Chong Wageningen University and Research, NL	Azole fungicide resistance in <i>Mycosphaerella fijiensis</i> populations from Central and South America
11:50	Prof. Matthias Hahn University of Kaiserslautern, D	High frequency occurrence of multiple fungicide resistance and of a novel taxonomic clade of <i>Botrytis</i> spp. in German strawberry fields
12:10	Prof. Richard Oliver ACNFP, Curtin University, AUS	Exploring the molecular basis underlying fungicide resistance in <i>Botrytis</i> spp. infecting pulses in Australia
12:30	Lunch	
14:00-22:00	Excursion	

Wednesday, April 24, 2013

**Resistance Risk Assessment** - Chair: Dr. Andreas Mehl

09:00	Dr. Neil Paveley ADAS, UK	<i>Keynote:</i> Improving the predictive power of resistance risk assessment
09:30	Mrs. Hilda Dooley Teagasc, IRL	Slowing the increase in fungicide resistance – does rate or type of application matter?
09:50	Dr. Peter Hobbelen Rothamsted Research, UK	The usefulness of mixing two fungicides as a resistance management strategy: a modelling analysis
10:10	Dr. Alexey Mikaberidze ETH Zürich, CH	When do fungicide mixtures select for fungicide resistance?
10:30	Coffee	
10:50	Dr. Bart Fraaije Rothamsted Research, UK	The use of azole and SDHI fungicides to control Septoria leaf blotch in the UK
11:10	Mrs. Anne-Sophie Walker INRA, BIOGER-CPP, F	Habitat- and host-specific differentiation in the multihost fungal pathogen <i>Botryotinia fuckeliana</i> and evidence for fungicide selection in populations
11:30	Prof. Louise May de Mio Universidade Federal do Paraná, BR	Tebuconazole and thiophanate-methyl fungicides resistance assessment of <i>Monilinia</i> species from South Brazil peach orchards
11:50	Dr. Gerd Stammler BASF SE, D	Resistance management of metrafenone in powdery mildews
12:10	Lunch	
13:30	Dr. Heiko Feldmann DPG, D	Instructions for the <i>Proceedings of the 17<sup>th</sup> International Reinhardsbrunn Symposium on Modern Fungicides and Antifungal Compounds</i>

**Complex II Inhibitors - Mode of Action and Resistance** - Chair: Dr. Gerd Stammler

13:50	Dr. Martin Semar BASF SE, D	Impact of mutations in the <i>sdh</i> gene on the sensitivity to different SDHIs in various pathogens
14:10	Mrs. Anne-Sophie Walker INRA, BIOGER-CPP, F	From enzyme to fungal development or how <i>sdhB</i> mutations impact respiration, fungicide resistance and fitness in the grey mold agent <i>Botrytis cinerea</i>
14:30	Mrs. Marta Piotrowska Scotland's Rural College (SRUC), UK	<i>Ramularia collo-cygni</i> - studying its potential fungicide resistance to <i>sdhis</i>
14:50	Dr. George Karaoglanidis Aristotelian University, GR	Fitness and competitive ability of <i>Botrytis cinerea</i> field isolates resistant to SDHI fungicides possessing different <i>sdhB</i> mutations
15:10	Coffee	

**Natural Antifungal Compounds** - Chair: Dr. Erich-C. Oerke

15:30	Dr. Peter Lüth Prophyta, D	<i>Keynote:</i> Plant protection using fungal antagonists
16:00-17:30	<b>Poster Demonstration II</b>	-Natural Antifungal Compounds -Sensitivity Monitoring

Thursday, April 25, 2013

**Regulatory Aspects and Food Chain Requirements** - Chair: Prof. P. Russell

08:00	Dr. Karsten Hohgardt Federal Office of Consumer Protection and Food Safety, D	<i>Keynote</i> : Challenges of regulation (EC) 1109/2009 and the new plant protection act
08:30	Dr. Lise Nistrup Jørgensen Institute of Agroecology, DK	Ranking of fungicides according to risk assessments for health and environment
08:50	Prof. Mohamed Khan North Dakota State Univ. and Univ. of Minnesota, USA	Developing fungicide recommendations for Cercospora leaf spot control in the USA
09:10	Coffee	

**Sensitivity Monitoring** - Chair: Dr. Helge Sierotzki

09:30	Dr. Trevor Wicks SARDI, AUS	Development in Australia of grape powdery mildew strains resistant to QoI fungicides
09:50	Dr. Rosie Bryson BASF SE, D	A European overview of the sensitivity of <i>Mycosphaerella graminicola</i> to DMI fungicides in vitro and the relative impact on field performance
10:10	Dr. Stephen Parnell Rothamsted Research, UK	Designing sensitivity monitoring programs for early detection
10:30	Dr. Guido Schnabel Clemson University, USA	Fungicide-induced mutagenesis in <i>Monilinia fructicola</i> and implications for resistance management
10:50	Dr. Huub Schepers Wageningen University Research, NL	Reduced efficacy of fluazinam against some Green 33-isolates of <i>Phytophthora infestans</i> in The Netherlands
11:10	Closing - Prof. Dr. Heinz-Wilhelm Dehne	

Monday, April 22, 2013

16:20-18:00 - **Poster Demonstration I**

**New Modes of Action and Fungicides** - Chair: Dr. Dietrich Hermann

Dr. Gayane Avetisyan  
N.V.Tsitsin Main Botanical Garden, Russia  
Influence of oxidative stress on the direction of infectious structures of the wheat powdery mildew pathogen

Dr. Thiruvengadam Raguchander  
Tamil Nadu Agricultural University, India  
Defense responses of grapevine to *Uncinula necator* induced by a new molecule: azoxystrobin

**New Technologies and Applications** - Chair: Dr. Bart Fraaije

Dr. Andrey Ryabchenko  
N. V. Tsitsin Main Botanical Garden, Russia  
Application of heat-conducting paste for investigation of refrigerated biological samples with scanning electron microscopy

Dr. Hideo Ishii  
National Institute for Agro-Environmental Sciences, Japan  
Treatments with acibenzolar-s-methyl protect cucumber plants from various diseases using orchestrated resistance mechanisms

Dr. Annegret Schmitt  
Julius-Kühn-Institute, Germany  
Innovative strategies for copper-free low input and organic farming systems (eu-project co-free)

Mr. Jürgen Derpmann  
University of Bonn, Germany  
Effects of fungicide strategies on benzimidazole resistance of *Botrytis cinerea* in grapevine

**Resistance Risk Assessment** - Chair: Dr. Andreas Mehl

Mrs. Marie-Cécile Dufour  
INRA, France  
Variability in the sensitivity of biotrophic grapevine pathogens (*Erysiphe necator* and *Plasmopara viticola*) to acibenzolar-s methyl and two phosphonates

Mrs. Sandra Gerth  
ZEPP, Germany  
Laboratory studies on the efficacy of cereal fungicides depending on temperature and concentration

Dr. James Fountaine  
Scotland's Rural College (SRUC), UK  
Fungicide resistance strategies in barley and oilseed rape

Mrs. Sabrina Rupp  
University of Kaiserslautern, Germany  
*Botrytis* anti-resistance management strategies in soft fruit fields

Mrs. Diana Steinhauer  
Syngenta Crop Protection, Switzerland  
Deciphering fungicide resistance mechanisms in *Mycosphaerella graminicola*, towards an assessment of resistance risk in new active ingredient research

Mr. Omar Gutierrez-Alonso  
Rothamsted Research, UK  
Investigating adaptation of *Mycosphaerella graminicola* to multi-site inhibitors

**Complex II Inhibitors - Mode of Action and Resistance** - Chair: Dr. Gerd Stammer

Dr. Kristin Klappach  
BASF SE, Germany  
Tomato fruit assay for SDHI efficacy on *Botrytis cinerea* strains with mutations in the *sdh* gene

Dr. Anastasios Malandrakis  
Agricultural University of Athens, Greece  
Biological and molecular characterization of *Penicillium expansum* isolates with laboratory-induced resistance to succinate dehydrogenase inhibitors (SDHIs)

**Fungicide Resistance - Molecular Aspects, Diagnostics and Genetics** - Chair: Prof. Ulrich Gisi

Dr. Marie-France Corio-Costet  
INRA, France

Assessment of fungicide resistance and pathogen diversity in *Erysiphe necator* using quantitative real-time PCR assays, in France (2008-2012)

Dr. Sabine Fillinger  
INRA, France

*Botrytis pseudocinerea* is resistant to the fungicide fenhexamid due to detoxification by the cytochrome p450 monooxygenase cyp684

Dr. Katarzyna Pieczul  
Institute of Plant Protection, Poland

Analysis of cyp51 gene in triazole resistant and sensitive isolates of *Cercospora beticola* collected in western Poland

Mr. Steven Kildea  
Teagasc, Ireland

Changes in the frequency of Irish *Mycosphaerella graminicola* cyp51 variants, 2006-2011

Dr. Gerd Stammler  
BASF SE, Germany

Pathogens with low QOI resistance risk

Dr. Guido Schnabel  
Clemson University, USA

Identification and characterization of fungicide resistance in *Botrytis cinerea* from strawberry



Wednesday, April 24, 2013

16:00-17:30 – **Poster Demonstration II**

**Natural Antifungal Compounds** - Chair: Dr. Erich-Ch. Oerke

Prof. Mohamed Sallam Assiut University, Egypt	Antifungal activity of certain plant extracts against early blight disease of tomato
Dr. Nashwa Sallam Assiut University, Egypt	Biocontrol of cantaloupe damping-off disease using formulations of antagonistic fungi
Prof. Mamdoh Ismail Ahmed El-Minia University, Egypt	Identification and pathogenicity of phytopathogenic bacteria associated with soft rot disease of girasole tuber in Egypt
Mr. AbdulAziz Al-Askar King Saud Univ., Saudi Arabia	<i>In vitro</i> antifungal activity of three Saudi plant extracts against some phytopathogenic fungi
Dr. Ali Elagael Tripoli University, Libya	Evaluation of antifungal metabolites produced by <i>Pseudomonas fluorescens</i> (PS02 and PS14) isolates for biocontrol of <i>Fusarium culmorum</i>
Dr. Setti Benali Université de Chlef, Algeria	Isolation, screening and characterization of Streptomyces species for biological control of crown gall caused by <i>Agrobacterium tumefaciens</i> .
Prof. Bencheikh Mohamed Université de Khemis Meliana, Algeria	Streptomyces efficiency against Ascochyta foot rot in pea ( <i>Pisum sativum</i> ) seedlings
Dr. Tatyana Yurina M.V.Lomonosov State University, Russia	On the allelopathic influence of some species of plants in agrocenoses symbiotic mycobiota
Dr. Larisa Shcherbakova Russian Research Institute of Phytopathology, Russia	Enhancing the sensitivity of <i>Stagonospora nodorum</i> to certain azole and strobilurin fungicides by co-application of natural compounds
Mr. David Garcia-Rellán Universidad Politécnica de Valencia, Spain	Composition and antifungal activity of <i>Satureja montana</i> l. essential oil against fungal pathogens associated with grapevine declines
Dr. Mercedes Verdeguer Sancho Universidad Politécnica de Valencia, Spain	Antimicrobial and herbicidal activity of eugenol, the main compound of <i>Syzygium aromaticum</i> (l.) merr. et l.m. Perry essential oil
Dr. Tarikere Ganapati Nagaraja The New College, Kolhapur, India	In vitro evaluation of antifungal properties of <i>Zanthoxylum rhetsa</i> (ROXB)DC
Dr. Kuppusami Prabakar Tamil Nadu Agricultural University, India	Antifungal compound from <i>Adenocalymma alliaceum</i> mediated disease resistance for the control of postharvest pathogens in mango
Dr. Patil Bhimarao Sadguru Gadage Maharaj College, India	Antifungal activity of some botanicals against inhibition of spore germination of <i>Puccinia purpurea</i> Cook

**Sensitivity Monitoring** - Chair: Dr. Helge Sierotzki

Prof. Mohamed Hassan Assiut University, Egypt	Acquired resistance to Ridomil Mancozeb on <i>Stemphylium vesicarium</i> the causal agent of onion stemphylium leaf blight in Egypt.
Mr. Douglas Wilson Nufarm, Australia	Yellow Sigatoka ( <i>Mycosphaerella musicola</i> ) populations develop resistance to QoI fungicides in Australia
Dr. Gerd Stammler BASF SE, Germany	Sensitivity of <i>Venturia inaequalis</i> to dithianon

Mrs. Natasha Akemi Hamada IFPR, Brazil	Sensibility of <i>Colletotrichum</i> spp., the causal agent of Glomerela leaf spot on apple, to mancozeb and tiophanate-methyl
Mrs. Irene Maja Nanni University of Bologna, Italy	Sensitivity to Carboxylic Acid Amide fungicides in <i>Plasmopara viticola</i> populations in Northern Italy
Dr. Marina Collina University of Bologna, Italy	Efficacy of an electrolyzed water (Verdeviva) towards pathogens of fruit crops
Mrs. Ellen Göbbels University of Bonn, Germany	Influence of timing on the effect of azole fungicides on Fusarium infection of wheat varieties differing in susceptibility
Dr. Duraisamy Saravanakumar Tamil Nadu Agricultural University, India	A combination of tebuconazole 50% + trifloxystrobin 25% wg for the management of <i>Alternaria</i> and <i>Fusarium</i> rot in tomato
Dr. Nenad Trkulja Inst. Plant Prot. and Environment, Belgrade, Serbia	The sensitivity of the Serbian populations of <i>Cercospora beticola</i> sacc. to benzimidazole and triazole fungicides