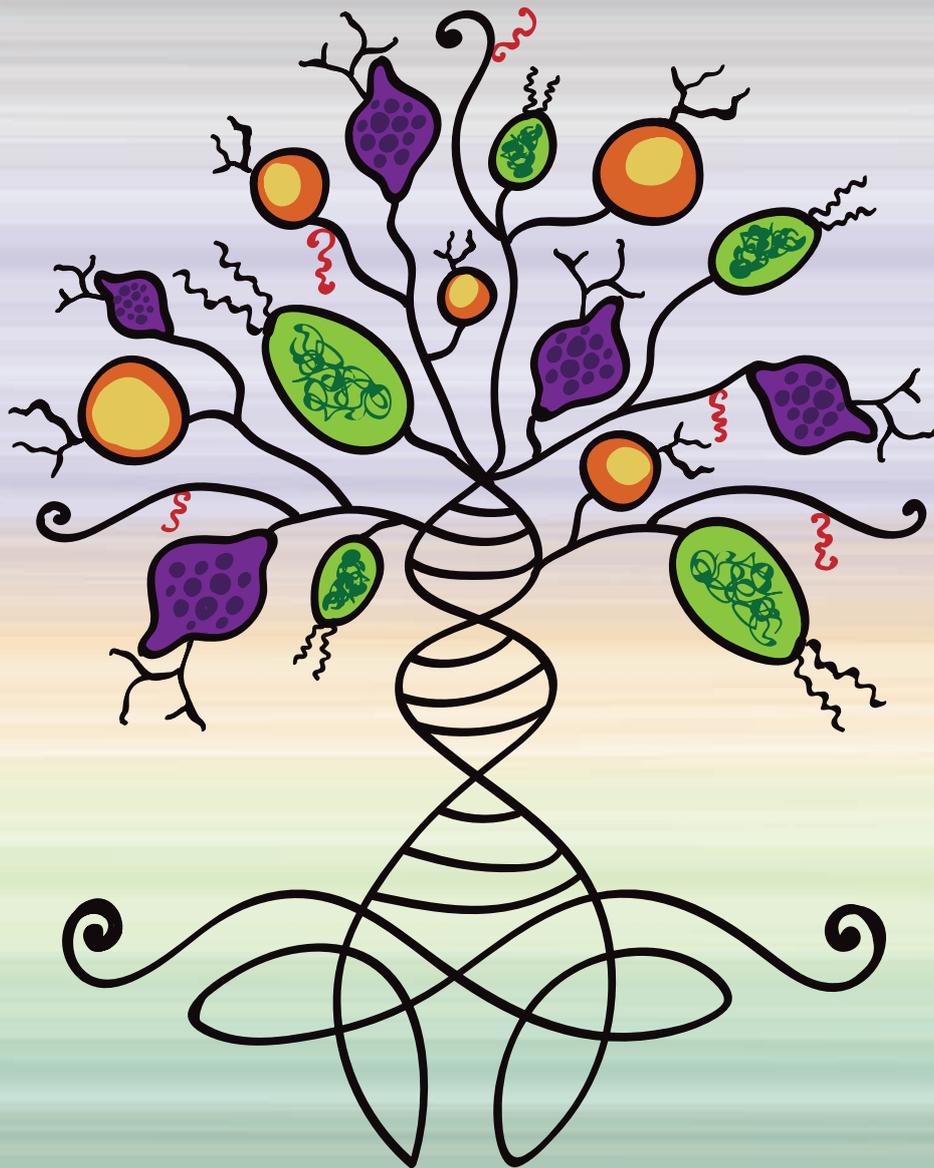


# IS-oppm 2019

## PROGRAM BOOK



XVIII CONGRESS

JULY 14-18, GLASGOW, SCOTLAND



GET ENGAGED.

GROW YOUR KNOWLEDGE.

MAKE CONNECTIONS.

**Publish** your work and submit to  
*Molecular Plant-Microbe Interactions (MPMI)*

**Grow** your career with the Career Center

**Read** the latest IS-MPMI member news in *Interactions*

**Find** a colleague and start collaborating using the Member Directory

**Network** with over 1,500 IS-MPMI members

[ismpmi.org/welcome](http://ismpmi.org/welcome)



Get all the latest updates!  
Follow IS-MPMI.



## Welcome to Glasgow and the XVIII International Congress on Molecular Plant-Microbe Interactions!

We have created a wide-reaching program that showcases emerging topics in plant-microbe interactions; new concurrent sessions on topics such as post-translational modifications, long-distance/systemic signaling, invertebrate-plant interactions, and environmental impacts on microbial infection; and established popular sessions on symbiosis and mutualism, microbial manipulation of the host, molecular recognition, and cell biology. A diverse selection of satellite meetings will be offered on Sunday, July 14, and a workshop on Tuesday, July 16, will highlight the importance of scientific reproducibility.

We are proud to have achieved gender balance in our slate of plenary speakers and to have speakers for the scheduled talks that represent the full diversity of the scientists working in our field. More than 1,400 delegates from 52 countries have registered to attend the meeting to discuss the current breakthroughs and future directions of research on plant-microbe interactions. Seventy early career researchers have received travel awards to attend the congress; they will meet on Sunday for training in science communication and on Monday during the lunch break to network with the plenary speakers.

The main program begins Sunday afternoon with the IS-MPMI Awardee Lecture by Brian Staskawicz of the University of California, Berkeley (U.S.A.), “From Avirulence Genes to Gene Editing: The Quest for Durable Resistance in Agricultural Crops.” This lecture will be closely followed by the opening keynote presentation, “How to Avoid Being a Good Host,” presented by Jonathan Jones of The Sainsbury Laboratory (U.K.) on his sixty-fifth birthday! Monday morning will start off with the EMBO Keynote Lecture by Jane Parker of the Max Planck Institute (Germany), “Regulation of Resistance and Cell Death Pathways in TNL Receptor Immunity.” On Wednesday morning, IS-MPMI Young Investigator Awardee Katharina Markmann of Tübingen University (Germany) and Aarhus University (Denmark) will give her presentation, “A Micro RNA Acts as a Systemic Mediator of Symbiotic Susceptibility,” and Thursday evening, Xinnian Dong of Duke University (U.S.A.) will deliver the closing keynote address, “Precision in Plant Immune Expression: Not Lost in Translation.”

We urge you get out and explore Glasgow during your stay! Our remarkable city lies along the River Clyde in the western Scottish Lowlands. It is the nation’s largest city and has a rich industrial past in trade and shipbuilding. Famous for its Art Nouveau architecture, Glasgow boasts a vibrant music scene and acclaimed museums, such as the Kelvingrove Art Gallery and Museum, which is near the congress venue. Glasgow is also home to the Scottish Ballet, the Scottish Opera, and the National Theatre of Scotland. Excellent dining venues and fine drinking establishments are available throughout the city center, and Glaswegians are famous for their friendliness and humor. Plan on attending the closing banquet at Merchant Square, which will feature an informal meal followed by the energy and vibrancy of a traditional Scottish cèilidh.

We would like to thank our fellow members of the local Scientific Committee, along with volunteers from the University of Dundee and The James Hutton Institute, members of the IS-MPMI board of directors, and the staff at IS-MPMI headquarters, for their time, energy, patience, enthusiasm, and help during the planning and organization of the XVIII Congress.

**Welcome to Glasgow!**

**Paul Birch**, University of Dundee and The James Hutton Institute  
**John Jones**, The James Hutton Institute and University of St. Andrews  
**Local Scientific Committee Chairs**  
**XVIII International Congress on Molecular Plant-Microbe Interactions**

# ACKNOWLEDGMENTS | TABLE OF CONTENTS

## Local Scientific Committee

**Program Co-Chair:** Paul Birch, *University of Dundee and The James Hutton Institute*  
**Program Co-Chair:** John Jones, *The James Hutton Institute and University of St. Andrews*

Dawn Arnold, *University of the West of England*  
Mark Banfield, *John Innes Centre*  
Petra Boevink, *The James Hutton Institute*  
Jorunn Bos, *University of Dundee and The James Hutton Institute*  
Davide Bulgarelli, *University of Dundee*  
Katherine Denby, *University of York*  
Sebastian Eves-van den Akker, *University of Cambridge*  
Christine Faulkner, *John Innes Centre*  
Eleanor Gilroy, *The James Hutton Institute*  
Murray Grant, *University of Warwick*  
Kim Hammond-Kosack, *Rothamsted Research*  
Ingo Hein, *The James Hutton Institute and University of Dundee*  
Saskia Hogenhout, *John Innes Centre*  
Nicola Holden, *The James Hutton Institute*  
Edgar Huitema, *University of Dundee*  
Jonathan Jones, *The Sainsbury Laboratory, Norwich*  
Sophien Kamoun, *The Sainsbury Laboratory, Norwich*  
Gary Loake, *The University of Edinburgh*  
Giles Oldroyd, *John Innes Centre*  
Uta Paszkowski, *University of Cambridge*  
Gail Preston, *University of Oxford*  
Silke Robatzek, *Ludwig-Maximilians-Universität München*  
Sarah Robertson, *The James Hutton Institute*  
Diane Saunders, *John Innes Centre*  
Sebastian Schornack, *The Sainsbury Laboratory, Cambridge*  
Steven Spoel, *The University of Edinburgh*  
Nick Talbot, *The Sainsbury Laboratory, Norwich*  
Lesley Torrance, *The James Hutton Institute and University of St. Andrews*  
Cyril Zipfel, *University of Zurich*

## IS-MPMI Board of Directors

**President:** Regine Kahmann, *Max Planck Institute for Terrestrial Microbiology*  
**President-Elect:** Mary Beth Mudgett, *Stanford University*  
**Immediate Past President:** Sheng Yang He, *Michigan State University*  
**Secretary:** Jean Greenberg, *University of Chicago*  
**Treasurer:** Roger Innes, *Indiana University*  
**Editor-in-Chief, *Molecular Plant-Microbe Interactions*:**  
Jeanne Harris, *University of Vermont*  
**Editor-in-Chief, *Interactions*:** Dennis Halterman, *USDA ARS*

### Directors

Saskia Hogenhout, *John Innes Centre*  
Francis Michel Martin, *French National Institute for Agricultural Research (INRA)*  
Peter Moffett, *Université de Sherbrooke*  
Uta Paszkowski, *University of Cambridge*  
Jens Stougaard, *Aarhus University*  
Jian-Min Zhou, *Chinese Academy of Sciences*

## Table of Contents

Connect with IS-MPMI .....	3
Sponsors .....	4
General Information .....	5
Exhibit Hall — Hall 5.....	6
Maps	
Scottish Event Campus (SEC) .....	7
Downtown Glasgow .....	8
Program-at-a-Glance .....	9
Daily Schedule and Scientific Sessions	
Sunday, July 14	
Daily Schedule .....	10
Scientific Sessions .....	11
Monday, July 15	
Daily Schedule .....	12
Scientific Sessions .....	12
Tuesday, July 16	
Daily Schedule .....	15
Scientific Sessions .....	15
Wednesday, July 17	
Daily Schedule .....	17
Scientific Sessions .....	17
Thursday, July 18	
Daily Schedule .....	20
Scientific Sessions .....	20
Travel Awards .....	23
Posters	
Poster Schedule and Poster Titles by Category .....	24
Flash Talk Presentations .....	25
Poster Titles and Authors .....	26
Notes .....	60

## THE CONGRESS AT YOUR FINGERTIPS

With the congress mobile app, you will receive the latest congress updates, have access to more content than provided in the program book, and be able to connect with other attendees.

### Here are the best features:

- Browse the program schedule, exhibitor list, posters, and general information.
- Customize your schedule.
- Access session information, including full abstracts.
- Add exhibitors to your to-do list.
- Connect with other attendees—send messages and make appointments.
- Contact poster authors directly to schedule time outside regular poster hours to meet and discuss poster content.

**Get the app—it's free!** Available for iOS (iPhone and iPad) and Android devices.

Go to [ismpmi.org/mobileapp](http://ismpmi.org/mobileapp) to find links to your mobile app store, or search for ISMPMI in your app store.



## Get Social! Share Your Congress Experience

Follow and join our social media groups so you can connect now and after the congress.



On Twitter? Use #ICMPMI2019 throughout the congress and follow @ISMPMI.



Like The International Society for Molecular Plant-Microbe Interactions on Facebook.

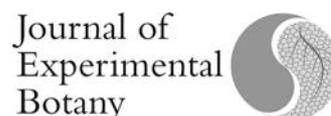


Join The International Society for Molecular Plant-Microbe Interactions (IS-MPMI) group on LinkedIn.

## Engage Your Network! Propel the Online Congress Conversations

We want to hear from you online! Tweet about your favorite presentation moments using #ICMPMI2019; share your photos on Facebook and tag your friends; and publish updates to your personal blog to share your favorite moments. Get excited and get connected at this year's congress!

# THANK YOU TO OUR SPONSORS



United States Department of Agriculture  
National Institute of Food and Agriculture



# GENERAL INFORMATION

## Complimentary Wi-Fi

IS-MPMI is providing complimentary Wi-Fi service throughout the meeting space at the SEC. To access Wi-Fi, select **SEC Wi-Fi** from the list of networks. No password is required. Simply click **Connect** when the login page appears, and you will be online.

## Registration Desk Hours

*Hall 5*

Sunday, July 14	8:00–17:00
Monday, July 15	8:00–19:30
Tuesday, July 16	8:30–13:00
Wednesday, July 17	8:30–19:30
Thursday, July 18	8:00–15:00

## Instructions for Plenary and Concurrent

### Speakers

The **Speaker Ready Room** will be available for speakers to upload and make changes to their presentations.

### Speaker Ready Room Location and Hours

*Fyne*

Sunday, July 14	8:30–19:00
Monday, July 15	8:00–17:00
Tuesday, July 16	8:00–12:00
Wednesday, July 17	8:00–16:30
Thursday, July 18	8:00–16:00

## Lunch Options

For lunch, several pods will sell hot and cold foods inside Hall 5. Another option is the Clydebuilt Bar & Kitchen, located in the main corridor of the SEC directly opposite Hall 5, which provides a range of hot foods plus hot and cold drinks. Also in the main corridor of the SEC is a McColl's newsagent. The Rotunda, which houses four restaurants, is less than a 5-minute walk from the conference venue (across the road from the main entrance to the SEC). Finally, search for additional dining options in the IS-MPMI mobile app under the heading **Around Glasgow**.

## Guests

Attendees who registered guests and purchased tickets to the welcome reception and/or closing banquet will receive their guests' name badges and event tickets when they check in onsite. Ticketed events are sold out—no onsite tickets will be sold. Stop by the registration desk to inquire if any spaces have opened up.

## Photo Release

Photographs will be taken at the XVIII Congress. By registering for this congress, you agree to allow IS-MPMI to use your photo in any of the organization's publications or websites.

## Dress

The official dress of the congress is business casual.

## Expected Behavior Policy

We are dedicated to providing a harassment-free meeting experience for everyone, regardless of gender, sexual orientation, disability, physical appearance, body size, race, or religion. We will not tolerate harassment of participants in any form. We ask all attendees, exhibitors, speakers, sponsors, volunteers, guests, and other participants to be considerate of and respectful to all members and to refrain from demeaning, discriminatory, or harassing behavior and speech. Please note, if you register a guest for the meeting, you may be held responsible for the actions of the guest. Violations of this policy should be reported to meeting staff.

IS-MPMI reserves the right to remove any individual from attendance or other participation in any IS-MPMI-sponsored event without prior warning or issuance of a refund and to take additional action as determined necessary, up to and including expulsion from participation in IS-MPMI. Any course of action recommended by IS-MPMI is final.

## Congress Facilities

All congress activities take place at the Scottish Event Campus (SEC) unless otherwise noted in the daily schedule.

### Scottish Event Campus (SEC)

Exhibition Way  
Glasgow G3 8YW, U.K.

### Glasgow Science Centre (Welcome Reception)

50 Pacific Quay  
Glasgow G51 1EA, U.K.

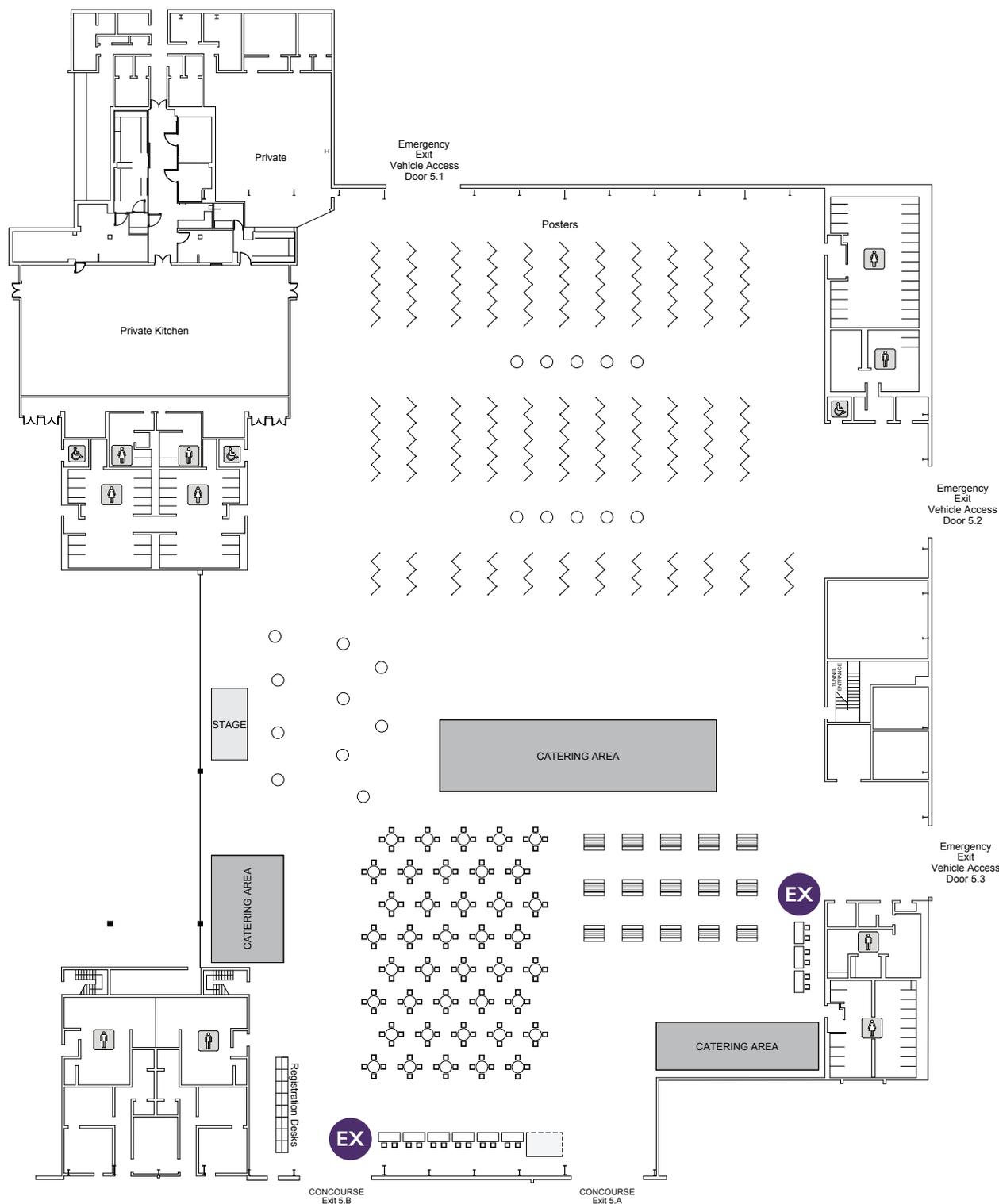
### Waxy O'Connor's (IS-MPMI Diversity Celebration)

44 West George Street  
Glasgow G2 1DH, U.K.

### Merchant Square (Congress Closing Cèilidh and Celebration)

71 Albion St  
Glasgow G1 1NY, U.K.

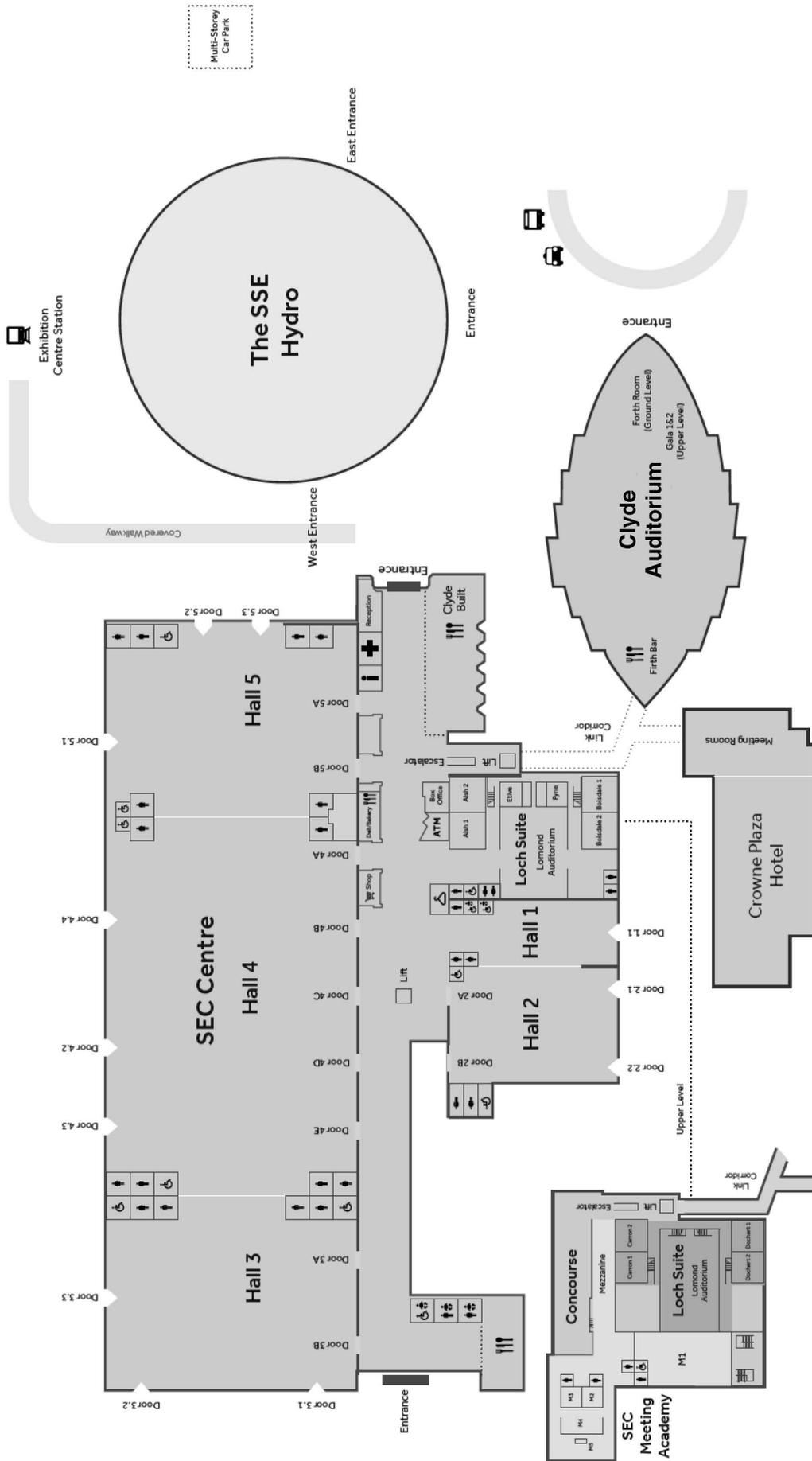
# EXHIBIT HALL — Hall 5



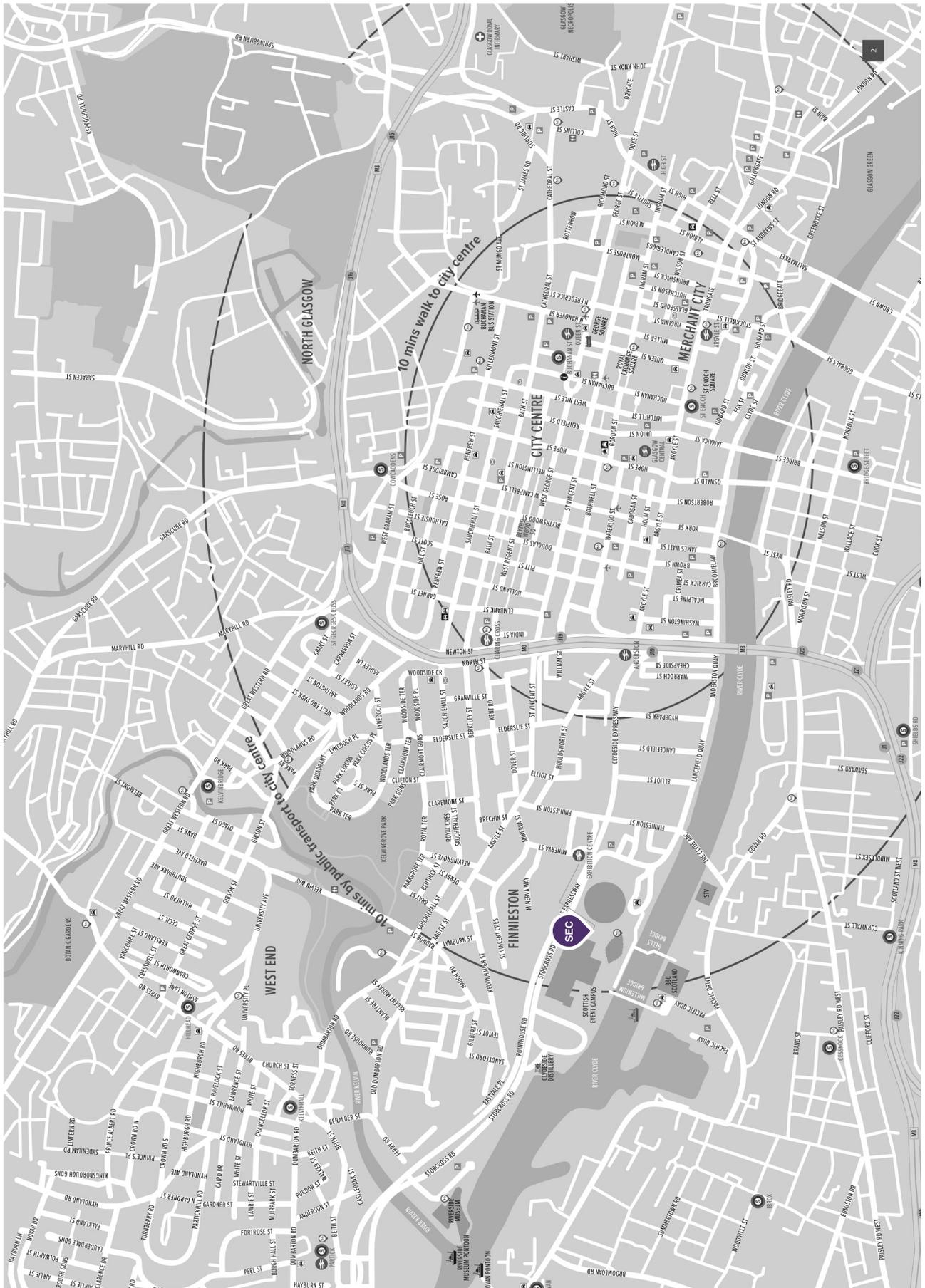
## EX Exhibitor Listing

- BMG Labtech
- British Society for Plant Pathology (BSPP)
- Cambridge Bioscience
- CLF Plant Climatics
- Conviron
- Frontiers in Plant Science
- Journal of Experimental Botany*
- LI-COR Biosciences
- New Phytologist Trust
- PhytoTech Labs

# SCOTTISH EVENT CAMPUS (SEC)



# DOWNTOWN GLASGOW



## PROGRAM-AT-A-GLANCE

Posters can be viewed on Monday between 08:30 – 20:00, Tuesday between 08:30 – 12:30, Wednesday between 08:30 – 20:00, and Thursday between 08:30 – 13:30. Posters are located in Hall 5.

Sunday, July 14	Monday, July 15	Tuesday, July 16	Wednesday, July 17	Thursday, July 18
<b>08:30 – 15:00</b> <b>Satellite Meeting*</b> Dynamics and Mechanisms of Insect-Transmitted Pathogens <i>Boisdale 1</i>	<b>08:30 – 10:10</b> <b>Plenary Session 2</b> <i>Clyde Auditorium</i>	<b>08:30 – 10:10</b> <b>Plenary Session 4</b> <i>Clyde Auditorium</i>	<b>08:30 – 10:10</b> <b>Plenary Session 5</b> <i>Clyde Auditorium</i>	<b>8:30 – 10:30</b> <b>Concurrent Session 16</b> Cell Biology of Host-Microbe Interactions I <i>Clyde Auditorium</i>  <b>Concurrent Session 17</b> Symbiosis & Mutualism <i>Lomond Auditorium</i>  <b>Concurrent Session 18</b> Apoplastic Interactions <i>M1</i>
	<b>10:10 – 10:40</b> Coffee Break <i>Hall 5</i>	<b>10:10 – 10:40</b> Coffee Break <i>Hall 5</i>	<b>10:10 – 10:40</b> Coffee Break <i>Hall 5</i>	<b>10:30 – 11:00</b> Coffee Break <i>Hall 5</i>
<b>09:00 – 15:00</b> <b>Satellite Meetings*</b>  Powdery Mildew Symposium <i>M1</i>  Gram Positive Plant-Associated Bacteria <i>Alsh 2</i>  Interactions Between Plants and Human Pathogens <i>Alsh 1</i>  New Insights into Rice-Pathogen Interactions <i>Lomond Auditorium</i>  Intracellular and Extracellular Perception of Viruses <i>Gala Room</i>	<b>10:40 – 12:40</b> <b>Concurrent Session 1</b> Molecular Recognition in Plant Immunity I <i>Clyde Auditorium</i>  <b>Concurrent Session 2</b> Emerging Topics in Plant Microbe Interactions I <i>Lomond Auditorium</i>  <b>Concurrent Session 3</b> Emerging and Re-Emerging Pathosystems <i>M1</i>	<b>10:40 – 12:40</b> <b>Concurrent Session 7</b> Post-Translational Modifications and Their Control of Immunity <i>Clyde Auditorium</i>  <b>Concurrent Session 8</b> Host-Microbe Co-Evolution <i>Lomond Auditorium</i>  <b>Concurrent Session 9</b> How the Environment Impacts Microbial Infection—Sponsored by BSPP <i>M1</i>  <b>Workshop</b> Reproducibility in Science <i>Forth Room</i>	<b>10:40 – 12:40</b> <b>Concurrent Session 10</b> Microbial Manipulation of the Host I <i>Clyde Auditorium</i>  <b>Concurrent Session 11</b> Microbiome and Phytobiome I <i>Lomond Auditorium</i>  <b>Concurrent Session 12</b> Systems Biology and Modelling <i>M1</i>	<b>11:00 – 13:00</b> <b>Concurrent Session 19</b> Cell Biology of Host-Microbe Interactions II <i>Clyde Auditorium</i>  <b>Concurrent Session 20</b> Comparative Mutualist and Pathogen Studies <i>Lomond Auditorium</i>  <b>Concurrent Session 21</b> Invertebrate (Nematode/Insect)-Plant Interaction <i>M1</i>
<b>Lunch Break</b>				
	<b>13:50 – 15:50</b> <b>Concurrent Session 4</b> Molecular Recognition in Plant Immunity II <i>Clyde Auditorium</i>  <b>Concurrent Session 5</b> Emerging Topics in Plant-Microbe Interactions II <i>Lomond Auditorium</i>  <b>Concurrent Session 6</b> Long-Distance/Systemic Signaling <i>M1</i>	<b>Free Afternoon</b>	<b>13:50 – 15:50</b> <b>Concurrent Session 13</b> Microbial Manipulation of the Host II <i>Clyde Auditorium</i>  <b>Concurrent Session 14</b> Microbiome and Phytobiome II <i>Lomond Auditorium</i>  <b>Concurrent Session 15</b> Population Biology (Ecology, Genomics) <i>M1</i>	<b>14:00 – 16:05</b> <b>Plenary Session 7</b> <i>Clyde Auditorium</i>
<b>15:30 – 17:10</b> <b>Opening Ceremony</b> <i>Clyde Auditorium</i>	<b>15:50 – 16:20</b> Coffee Break <i>Hall 5</i>		<b>15:50 – 16:20</b> Coffee Break <i>Hall 5</i>	<b>16:05 – 16:30</b> Coffee Break <i>Clyde Auditorium</i>
<b>17:10 – 17:40</b> Coffee Break <i>Clyde Auditorium</i>	<b>16:20 – 18:00</b> <b>Plenary Session 3</b> <i>Clyde Auditorium</i>		<b>16:20 – 18:00</b> <b>Plenary Session 6</b> <i>Clyde Auditorium</i>	<b>16:30 – 18:30</b> <b>Plenary Session 8 and Closing Ceremony</b> <i>Clyde Auditorium</i>
<b>17:40 – 19:00</b> <b>Plenary Session 1</b> <i>Clyde Auditorium</i>	<b>18:15 – 19:30</b> <b>Flash Talks</b> <i>Hall 5</i>		<b>18:15 – 19:30</b> <b>Flash Talks</b> <i>Hall 5</i>	
<b>19:00 – 21:30</b> <b>Welcome Reception</b> <i>Glasgow Science Centre (offsite)</i>		<b>19:00 – 22:30</b> <b>IS-MPMI Diversity Celebration</b> <i>Waxy O'Connor's (offsite)</i>		<b>19:30 – 22:00</b> <b>Congress Closing Ceilidh and Celebration</b> <i>Merchant Square (offsite)</i>

\*Preregistration and ticket required

# DAILY SCHEDULE AND SCIENTIFIC SESSIONS

All congress activities take place at the SEC unless otherwise noted.

## Sunday, July 14

08:00–17:00	Registration Open	Hall 5
08:30–13:00	Board of Directors Meeting	Boisdale 2
08:30–15:00	SATELLITE MEETING: Dynamics and Mechanisms of Insect-Transmitted Pathogens	Boisdale 1
08:30–15:05	SATELLITE MEETING: Powdery Mildew Symposium	M1
08:30–15:30	Exhibitor Set-Up	Hall 5
08:30–15:30	Poster Set-Up (Session 1)	Hall 5
08:30–19:00	Speaker Ready Room Open	Fyne
09:00–15:00	SATELLITE MEETING: Gram-Positive Plant-Associated Bacteria	Alsh 2
09:00–15:00	SATELLITE MEETING: Interactions Between Plants and Human Pathogens	Alsh 1
09:00–15:00	SATELLITE MEETING: New Insights into Rice-Pathogen Interactions	Lomond Auditorium
09:00–15:05	SATELLITE MEETING: Extracellular and Intracellular Perception of Viruses	Gala Room
13:00–15:00	IS-MPMI Travel Awardee Workshop ( <i>invitation only</i> )	Forth Room
15:30–17:10	Opening Ceremony	Clyde Auditorium
17:10–17:40	Coffee Break	Clyde Auditorium
17:40–19:00	Plenary Session 1	Clyde Auditorium
19:00–21:30	Welcome Reception	Glasgow Science Centre (offsite)

## SUNDAY HIGHLIGHTS

### Opening Ceremony

15:30–17:10 • Clyde Auditorium

### Welcome, Congress Highlights, and IS-MPMI Update

Speakers: Paul Birch, *University of Dundee and The James Hutton Institute, U.K.*; Regine Kahmann, *Max Planck Institute for Terrestrial Microbiology, Germany*

### IS-MPMI Awardee Lecture

Speaker: Brian Staskawicz, *Innovative Genomics Institute, University of California, Berkeley, U.S.A.*



Brian Staskawicz is a professor of plant and microbial biology and the scientific director of agriculture genomics at the Innovative Genomics Institute at the University of California, Berkeley. During this presentation, “**From Avirulence Genes to Gene Editing: The Quest for Durable Resistance in Agricultural Crops**,” Staskawicz will highlight important scientific highlights from his laboratory over the past several decades that have led to a greater mechanistic understanding of the molecular basis of plant pathogen specificity and the expression of plant disease resistance. He will emphasize how these basic discoveries have now led to translational applications in several agricultural crops. Staskawicz will also present

a multiprong approach to deploy several complimentary disease-resistance mechanisms to minimize the ability of pathogens to overcome disease resistance. Finally, he will review his team’s current efforts in developing gene-editing technologies to engineer plants for broad-spectrum resistance.

### How to Avoid Being a Good Host

Speaker: Jonathan Jones, *The Sainsbury Laboratory, Norwich, U.K.*



Jonathan Jones is a plant molecular geneticist who has made distinctive contributions to understanding how plants resist disease and how pathogens circumvent host immune mechanisms. Jones was born in 1954 in London and also grew up there. He graduated from Cambridge University with a degree in botany (1976) and earned a PhD jointly between the Cambridge Genetics Department and the Plant Breeding Institute in Trumpington (1980). After post-doctoral work with Fred Ausubel at Harvard University on symbiotic nitrogen fixation (1981–1982), he worked at start-up ag-biotech company, AGS, in Oakland, California; there, he worked closely with Hugo Dooner to study the behavior of maize transposons in tobacco. Since 1988, Jones has worked at The Sainsbury Laboratory, Norwich, serving as head of laboratory from 1994 to 1997 and from 2003 to 2009. He was elected a member of the European Molecular Biology Organization (EMBO) in 1998 and a Fellow of the Royal Society in 2003. In 2012, he was awarded the E. C. Stakman Award by the University of Minnesota. Jones is also a professor at the University of East Anglia. He has served as advisor to the Danforth Centre in St. Louis and is an advisor to the 2Blades Foundation in Chicago.



## Welcome Reception

19:00–21:00 • Glasgow Science Centre (offsite)

Join friends and colleagues for food, drinks, and conversation as we head over to the Glasgow Science Centre for the official welcome reception. While connecting with colleagues and savoring refreshments, attendees will be free to view the Science Centre exhibits and enjoy spectacular views of the River Clyde. The event is within walking distance of the SEC. After a special welcome from the Lord Provost of Glasgow, attendees will be led from the SEC over the bridge to the Glasgow Science Centre by pipers.

## SATELLITE MEETINGS

Preregistration and ticket are required for all satellite meetings. Full program details, speakers, and abstracts can be found in the mobile app and on the meeting website at [ismpmi.org/Congress/2019](http://ismpmi.org/Congress/2019).

### Dynamics and Mechanisms of Insect-Transmitted Pathogens

08:30–15:00; Boisdale 1

Chairs: Saskia A. Hogenhout, John Innes Centre, U.K.; Silke Robatzek, The Sainsbury Laboratory, University of East Anglia, Norwich, U.K.; Steven E. Lindow, University of California, U.S.A.; Sheng Yang He, Michigan State University, U.S.A.

### Powdery Mildew Symposium

08:30–15:05; M1

Chairs: Ralph Panstruga, RWTH Aachen University, Germany; Pietro D. Spanu, Imperial College London, U.K.; Hans Thordal-Christensen, University of Copenhagen, Denmark

### Gram Positive Plant-Associated Bacteria

09:00–15:00; Alsh 2

Chairs: Gitta L. Coaker, University of California, Davis, U.S.A.; Chang-Sik Oh, Kyung Hee University, Korea, Republic of (South); Jeff H. Chang, Oregon State University, U.S.A.

### Interactions Between Plants and Human Pathogens

09:00–15:00; Alsh 1

Chairs: Maeli Melotto, University of California, Davis, U.S.A.; Nicola Holden, The James Hutton Institute, U.K.

### Extracellular and Intracellular Perception of Viruses

09:00–15:05; Gala Room

Chairs: Jeanmarie Verchot, Oklahoma State University, U.S.A.; Kristiina Mäkinen, University of Helsinki, Finland; Miguel A. Aranda, CEBAS-CSIC, Spain

### New Insights into Rice-Pathogen Interactions

09:00–15:00; Lomond Auditorium

Chairs: Jonathan M. Jacobs, The Ohio State University, U.S.A.; Prof. Guo-Liang Wang, The Ohio State University, U.S.A.

## SCIENTIFIC SESSIONS

Scientific content listed in the program is as submitted by the authors/presenter and has NOT been edited.

### Opening Ceremony

15:30–17:10, Clyde Auditorium

- 15:30 Welcome & Congress Highlights  
P. BIRCH, Local Scientific Committee, Program Co-Chair
- 15:40 IS-MPMI Update  
R. KAHMANN, IS-MPMI President
- 15:50 IS-MPMI Awardee Lecture  
B. J. STASKAWICZ, Innovative Genomics Institute, University of California, Berkeley, U.S.A.
- 16:30 How to Avoid Being a Good Host  
J. D. JONES, The Sainsbury Laboratory, Norwich, U.K.

### Plenary Session 1

17:40–19:00, Clyde Auditorium

Moderator: Dawn Arnold, University of the West of England, U.K.

- 17:40 Arbuscular mycorrhiza development and function  
C. GUTJAHR, Technical University of Munich (TUM)–Plant Genetics, Germany; Plant Genetics, TUM School of Life Sciences, Germany
- 18:05 The regulation and signaling mechanisms of the cell surface receptor-like kinase complexes in plant immunity and growth  
L. SHAN, Texas A&M University, U.S.A.
- 18:30 Molecular dialogue between insect eggs and *Arabidopsis thaliana*  
P. REYMOND, University of Lausanne, Switzerland
- 18:55 Welcome from the Lord Provost of Glasgow

# DAILY SCHEDULE AND SCIENTIFIC SESSIONS

All congress activities take place at the SEC unless otherwise noted.

## Monday, July 15

08:00–17:00	Speaker Ready Room Open	Fyne
08:00–19:30	Registration Open	Hall 5
08:30–10:10	<b>Plenary Session 2</b>	Clyde Auditorium
08:30–20:00	Poster Viewing (Session 1)	Hall 5
08:30–20:00	Exhibits Open	Hall 5
10:10–10:40	Coffee Break	Hall 5
10:40–12:40	<b>Concurrent Session 1: Molecular Recognition in Plant Immunity I</b>	Clyde Auditorium
10:40–12:40	<b>Concurrent Session 2: Emerging Topics in Plant Microbe Interactions I</b>	Lomond Auditorium
10:40–12:40	<b>Concurrent Session 3: Emerging and Re-Emerging Pathosystems</b>	M1
12:30–13:30	IS-MPMI Student Travel Awardees and Speaker Lunch ( <i>invitation only</i> )	Mezzanine
12:40–13:50	Lunch Break	Hall 5
13:50–15:50	<b>Concurrent Session 4: Molecular Recognition in Plant Immunity II</b>	Clyde Auditorium
13:50–15:50	<b>Concurrent Session 5: Emerging Topics in Plant-Microbe Interactions II</b>	Lomond Auditorium
13:50–15:50	<b>Concurrent Session 6: Long-Distance/Systemic Signalling</b>	M1
15:50–16:20	Coffee Break	Hall 5
16:20–18:00	<b>Plenary Session 3</b>	Clyde Auditorium
18:00–19:00	Poster Viewing with Authors Present (Session 1, Odds)	Hall 5
18:15–19:30	Flash Talks (Session 1)	Hall 5
19:00–20:00	Poster Viewing with Authors Present (Session 1, Evens)	Hall 5

## SCIENTIFIC SESSIONS

Scientific content listed in the program is as submitted by the authors/presenter and has NOT been edited.

### MORNING SESSIONS

#### Plenary Session 2

8:30–10:10, Clyde Auditorium

Moderator: Kim Hammond-Kosack, Rothamsted Research, U.K.

- 8:30 Regulation of resistance and cell death pathways in TNL receptor immunity, EMBO Keynote Speaker  
J. E. PARKER, Max Planck Institute for Plant Breeding Research, Germany
- 8:55 How do parasitic plants perceive host plants?  
K. SHIRASU, RIKEN Center for Sustainable Resource Science, Japan; The University of Tokyo, Japan
- 9:20 Immune signaling by receptor-like cytoplasmic kinases and an NLR in *Arabidopsis*  
J. M. ZHOU, Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, China
- 9:45 Exploring the landscape of molecular plant-geminivirus interactions  
R. LOZANO-DURAN, Shanghai Center for Plant Stress Biology, China

#### Concurrent Session 1: Molecular Recognition in Plant Immunity I

10:40–12:40, Clyde Auditorium

Chairs: Frank L. W. Takken, University of Amsterdam, Netherlands; Cyril Zipfel, University of Zürich, Switzerland

- 10:40 FERONIA and the regulation of receptor kinase-mediated signaling during immunity and beyond  
C. ZIPFEL, University of Zürich, Switzerland
- 11:00 Bacterial medium chain 3-hydroxy fatty acid metabolites trigger LORE-mediated immunity in *Arabidopsis thaliana*  
S. RANE, Technical University of Munich, Germany
- 11:20 Plant immunity regulated by cell wall integrity: Unveiling novel carbohydrate-based molecular patterns  
A. MOLINA, Universidad Politécnica de Madrid, Spain
- 11:40 The CC domains of NLR-type pathogen receptors play essential roles in oligomerization, network formation and immune signalling  
F. L. TAKKEN, University of Amsterdam, Netherlands
- 12:00 Dissection of the Tox3-PR1 protein interaction in the *Parastagonospora nodorum*-wheat interaction  
Y. C. SUNG, The Australian National University, Australia
- 12:20 A TIR-NBS-LRR protein is necessary for BAK1 autoimmune phenotypes and links BAK1-mediated cell death to effector triggered immunity  
L. YU, ZMBP, University of Tübingen, Germany

**Concurrent Session 2: Emerging Topics in Plant Microbe Interactions I**10:40–12:40, *Lomond Auditorium*

Chairs: Roger W. Innes, Indiana University, U.S.A.; Hailing Jin, University of California, Riverside, U.S.A.

- 10:40 Cross-kingdom small RNA trafficking between plants and fungal pathogens  
H. JIN, University of California, Riverside, U.S.A.
- 11:00 Isolation and analysis of RNA cargo in extracellular vesicles of *Ustilago maydis*  
S. KWON, Heinrich-Heine-Universität Düsseldorf, Germany
- 11:20 Arbuscular cell invasion coincides with extracellular vesicles and membrane tubules  
R. ROTH, University of Cambridge, U.K.
- 11:40 Extracellular vesicles as key mediators of plant-microbe interactions  
R. W. INNES, Indiana University, U.S.A.
- 12:00 Oomycetes: A new episode of cross kingdom RNA interference  
F. DUNKER, Ludwig-Maximilians University (LMU), Germany
- 12:20 Functions of extracellular vesicles in bacterial infection of plants  
M. JANDA, University of Chemistry and Technology, Czech Republic; Ludwig-Maximilians Universität, Germany

**Concurrent Session 3: Emerging and Re-Emerging Pathosystems**10:40–12:40, *M1*

Chairs: Diane G. O. Saunders, John Innes Centre, Norwich, U.K.; Niklaus J. Grünwald, USDA ARS, U.S.A.

- 10:40 Tackling a formidable foe: The re-emergence of wheat stem rust in western Europe  
D. G. O. SAUNDERS, John Innes Centre, U.K.
- 11:00 Syringopeptide phytotoxin is involved in the biofilm formation of *Pseudomonas fuscovaginae*, causing bacterial brown sheath rot disease of rice  
Y. LEE, Gyeongsang National University, Republic of (South) Korea
- 11:20 Develop effective protectants and therapies to manage citrus HLB and potato ZC using a novel class of citrus-derived antimicrobial peptides  
C. Y. HUANG, University of California, Riverside, U.S.A.
- 11:40 Comparative and population genomic analysis of clonal and sexual populations of *Phytophthora infestans*  
N. J. GRÜNWARD, USDA ARS, U.S.A.
- 12:00 Genomic characterisation of the *Alternaria alternata* species group informs diagnostics for host specific pathotypes  
A. D. ARMITAGE, NIAB EMR, U.K.
- 12:20 Genetic engineering of the Brassicaceae smut fungus *Thecaphora thlaspeos* and analysis of its RNAi system  
K. BÖSCH, Heinrich-Heine University, Germany

**AFTERNOON SESSIONS****Concurrent Session 4: Molecular Recognition in Plant Immunity II**13:50–15:50, *Clyde Auditorium*

Chairs: Thomas Kroj, INRA Montpellier, France; Bostjan Kobe, University of Queensland, Australia

- 13:50 Pathogen effector recognition by NLR immune receptors with integrated decoy domains  
T. KROJ, INRA Montpellier, France
- 14:10 Co-evolutionary diversification of barley MLA immune receptors by direct recognition of sequence-unrelated powdery mildew AVRAs effectors  
I. M. L. SAUR, Max Planck Institute for Plant Breeding Research, Germany
- 14:30 TIR domains of plant immune receptors are NAD<sup>+</sup> consuming enzymes that promote cell death  
M. T. NISHIMURA, Colorado State University, U.S.A.
- 14:50 Structural and biochemical analysis of plant TIR NAD<sup>+</sup> cleavage activity  
H. BURDETT, University of Queensland, Australia
- 15:10 Adapting to challenges: functions of the *Arabidopsis* immune adaptor SRFR1 and associated proteins  
W. GASSMANN, University of Missouri, U.S.A.
- 15:30 RPW8/HR repeats predict NLR-dependent hybrid performance  
E. CHAE, National University of Singapore, Singapore

**Concurrent Session 5: Emerging Topics in Plant-Microbe Interactions II**13:50–15:50, *Lomond Auditorium*

Chairs: Jeanne M. Harris, University of Vermont, U.S.A.; Tolga O. Bozkurt, Imperial College London, U.K.

- 13:50 Evolution of the LATD/NIP meristem function in roots and nodules.  
J. M. HARRIS, University of Vermont, U.S.A.
- 14:10 Cooperation between hyphal cells underpins plant colonization by the fungal pathogen *Sclerotinia sclerotiorum*  
S. RAFFAELE, Laboratory of Plant-Microbe Interactions, France

- 14:30 Developing CRISPR-Cas13 for multi-use RNA-targeting in plants  
D. E. COOK, Kansas State University, U.S.A.
- 14:50 Subversion of plant immunity at the host-pathogen interface  
T. O. BOZKURT, Imperial College London, U.K.
- 15:10 Conserved biochemical defenses underpin host responses to oomycete infection in an early divergent land plant lineage  
P. CARELLA, The Sainsbury Laboratory, University of Cambridge, U.K.
- 15:30 sRNA-mediated interaction between pathogenic fungus *Magnaporthe oryzae* and cereal model *Brachypodium distachyon*  
S. F. ZANINI, Justus-Liebig-Universität Gießen, Germany

### Concurrent Session 6: Long-Distance/Systemic Signalling (Sponsored by Journal of Experimental Botany)

13:50–15:50, M1

Chairs: Corina Vlot, Institute of Biochemical Plant Pathology, Helmholtz Zentrum München, Germany; Jean T. Greenberg, University of Chicago, U.S.A.

- 13:50 Insights into the sites of action of ALD1 using chimeric *Arabidopsis* with epidermal ALD1  
J. T. GREENBERG, University of Chicago, U.S.A.
- 14:10 A bacterially produced polyamine induces plant systemic susceptibility to pathogens  
C. H. HANEY, The University of British Columbia, Canada
- 14:30 Polycomb repressive complex 2 positively regulates systemic immunity and priming in *Arabidopsis thaliana*  
Y. TAJIMA, NARA Institute of Science and Technology, Japan
- 14:50 Monoterpenes act as volatile cues in intra-plant and inter-plant propagation of innate immunity  
C. VLOT, Institute of Biochemical Plant Pathology, Helmholtz Zentrum München, Germany
- 15:10 Insights behind the molecular mechanism of cytokinin-induced priming  
K. MCINTYRE, Colorado State University, U.S.A.
- 15:30 Structural analysis for a 1-piperidine-2-carboxylic acid reductase reveals functional conservation of a pipecolic acid pathway in systemic acquired resistance  
P. DING, The Sainsbury Laboratory, University of East Anglia, Norwich, U.K.

### Plenary Session 3

16:20–18:00, Clyde Auditorium

Moderator: Gail M. Preston, University of Oxford, U.K.

- 16:20 Activation of a plant NLR  
J. CHAI, Max Planck Institute for Plant Breeding Research, Germany
- 16:45 The leaf microbiota: Disassembling and rebuilding to explore plant microbe interactions  
J. A. VORHOLT, ETH Zürich, Switzerland
- 17:10 Rice NLRs and *Magnaporthe oryzae* AVR effectors: Their interactions and coevolution  
R. TERAUCHI, Kyoto University, Japan
- 17:35 The oomycete RXLR motif determines non-conventional secretion for effector delivery  
P. BOEVINK, The James Hutton Institute, U.K.



# DAILY SCHEDULE AND SCIENTIFIC SESSIONS

All congress activities take place at the SEC unless otherwise noted.

## Tuesday, July 16

08:00–12:00	Speaker Ready Room Open	Fyne
08:30–10:10	<b>Plenary Session 4</b>	Clyde Auditorium
08:30–12:30	Poster Viewing (Session 1)	Hall 5
08:30–12:30	Exhibits Open	Hall 5
08:30–13:00	Registration Open	Hall 5
10:10–10:40	Coffee Break	Hall 5
10:40–12:40	<b>Concurrent Session 7: Post-Translational Modifications and Their Control of Immunity</b>	Clyde Auditorium
10:40–12:40	<b>Concurrent Session 8: Host-Microbe Co-Evolution</b>	Lomond Auditorium
10:40–12:40	<b>Concurrent Session 9: How the Environment Impacts Microbial Infection, Sponsored by BSPP</b>	MI
10:40–12:40	<b>Workshop: Reproducibility in Science</b>	Forth Room
12:30–13:00	Poster Take-Down (Session 1)	Hall 5
13:00–14:00	Poster Set-Up (Session 2)	Hall 5
13:00–15:00	MPMI Editorial Board Meeting	Aish 1
13:00–20:00	<b>Free Afternoon</b>	
19:00–22:30	IS-MPMI Diversity Celebration, Sponsored by New Phytologist Trust	Waxy O'Connor's (offsite)

## TUESDAY HIGHLIGHT

### Workshop: Reproducibility in Science

10:40–12:40 • Forth Room

Chair: Benjamin Schwesinger, *Research School of Biology, The Australian National University, Canberra, ACT, Australia*

Reproducibility is a cornerstone of science and sets it apart from pseudo-science. This workshop will introduce you to reproducible workflows and a range of tools—from method-sharing websites to basic data management ideas and open-access repositories—that will help you share work with colleagues more effectively and allow others to build on what you have done. *This workshop is supported by MPMI, eLife, protocols.io, Addgene, and the Mozilla Science Foundation. Find out more at repro4everyone.org and @repro4everyone.*

## SCIENTIFIC SESSIONS

Scientific content listed in the program is as submitted by the authors/presenter and has NOT been edited.

### MORNING SESSIONS

#### Plenary Session 4

8:30–10:10, Clyde Auditorium

Moderator: Gary J. Loake, University of Edinburgh, U.K.

- 8:30 Leveraging genetic and genomic tools to dissect the molecular interaction between soybean and *Phakopsora pachyrhizi*  
S. H. BROMMONSCHENKEL, Universidade Federal de Viçosa, Brazil
- 8:55 Rewiring cellular pathways by tombusviruses for the biogenesis of the viral replication compartment  
P. NAGY, University of Kentucky, U.S.A.
- 9:20 AM symbiosis-conserved proteins modulate cell structure, signaling, and metabolism to enable root cells to host fungal endosymbionts  
M. J. HARRISON, Boyce Thompson Institute, U.S.A.
- 9:45 Root damage and immune responses at cellular resolution  
N. GELDNER, University of Lausanne, Switzerland

#### Concurrent Session 7: Post-Translational Modifications and Their Control of Immunity

10:40–12:40, Clyde Auditorium

Chairs: Piers A. Hemsley, University of Dundee, U.K.; Steven H. Spoel, University of Edinburgh, U.K.

- 10:40 S-acylation—Greasing the mechanisms of plant immunity  
P. A. HEMSLEY, University of Dundee and The James Hutton Institute, U.K.

- 11:00 Targeting post-translational modifications to open the black box of pattern recognition receptor signaling  
F. L. H. MENKE, The Sainsbury Laboratory, University of East Anglia, Norwich, U.K.
- 11:20 Exo70B2 subunit of the exocyst links immune signalling to the secretory pathway and autophagy  
M. TRUJILLO, Albert-Ludwigs-University Freiburg, Germany
- 11:40 Dynamic ubiquitination determines NPR1 transcriptional coactivator activity  
M. J. SKELLY, University of Edinburgh, U.K.
- 12:00 Stealth pathogen: Tomato immune suppression by effector modification.  
J. JELENSKA, University of Chicago, U.S.A.
- 12:20 Dual regulation of reactive oxygen species through direct ubiquitination and phosphorylation of the plant immune regulator RBOHD  
D. LEE, University of California, Berkeley, U.S.A.

### Concurrent Session 8: Host-Microbe Co-Evolution (Sponsored by PLoS Biology)

10:40–12:40, Lomond Auditorium

Chairs: Beat Keller, University of Zurich, Switzerland; Detlef Weigel, Max Planck Institute for Developmental Biology, Germany

- 10:40 Epistasis, the spice of life: Lessons from the study of the plant immune system  
D. WEIGEL, Max Planck Institute for Developmental Biology, Germany
- 11:00 Convergent evolution of Pik-1 immune receptors towards high-affinity binding of an effector from the rice blast fungus  
A. BIALAS, The Sainsbury Laboratory, University of East Anglia, Norwich, U.K.
- 11:20 Convergent gene loss in aquatic plants reveals novel plant immunity and drought response components  
E. L. BAGGS, University of California, Berkeley, U.S.A.
- 11:40 Molecular determinants of host specialization in grass powdery mildews  
B. KELLER, University of Zurich, Switzerland
- 12:00 Identification of *Rwt6*, a wheat resistance gene corresponding to PWT6 which is distributed in *Eleusine* and *Oryza* isolates of *Pyricularia oryzae*  
S. ASUKE, Kobe University, Japan
- 12:20 AVR2-mediated resistance to *Phytophthora infestans* by unrelated *R* genes from wild *Solanum* species  
C. AGUILERA GALVEZ, Wageningen University and Research, Netherlands

### Concurrent Session 9: How the Environment Impacts Microbial Infection (Sponsored by BSPP)

10:40–12:40, M1

Chairs: Sheng Yang He, Michigan State University, U.S.A.; Zuhua He, Shanghai Institutes for Biological Sciences, Chinese Academy of Sciences, China

- 10:40 “Disease-climate-microbiome” interactions in the phyllosphere  
S. Y. HE, Michigan State University and Howard Hughes Medical Institute, U.S.A.
- 11:00 Blue light receptor phototropin 1 increases plant susceptibility to *Phytophthora infestans*  
S. NAQVI, University of Dundee, U.K.
- 11:20 Molecular dissection of the influence of humidity on bacterial virulence and plant immunity  
X. XIN, Chinese Academy of Sciences, China
- 11:40 An H3K27me3 demethylase-HSFA2 loop controls thermomemory associated with attenuated immunity and early flowering in *Arabidopsis*  
Z. HE, Shanghai Institutes for Biological Sciences, Chinese Academy of Sciences, China
- 12:00 Temporal transcriptome profiling reveals distinct gene expression signatures associated with suppression of plant immunity by high temperature and high humidity  
A. MINE, Ritsumeikan University and PRESTO, Japan Science and Technology Agency, Japan
- 12:20 Phosphate status-dependent control of associations with beneficial and pathogenic fungi in *Arabidopsis thaliana*  
Y. SAIJO, NARA Institute of Science and Technology, Japan

# DAILY SCHEDULE AND SCIENTIFIC SESSIONS

All congress activities take place at the SEC unless otherwise noted.

## Wednesday, July 17

08:00–16:30	Speaker Ready Room Open	Fyne
08:30–10:10	Plenary Session 5	Clyde Auditorium
08:30–19:30	Registration Open	Hall 5
08:30–20:00	Poster Viewing (Session 2)	Hall 5
08:30–20:00	Exhibits Open	Hall 5
10:10–10:40	Coffee Break	Hall 5
10:40–12:40	Concurrent Session 10: Microbial Manipulation of the Host I	Clyde Auditorium
10:40–12:40	Concurrent Session 11: Microbiome and Phytobiome I	Lomond Auditorium
10:40–12:40	Concurrent Session 12: Systems Biology and Modelling	M1
12:40–13:50	Lunch Break	Hall 5
13:50–15:50	Concurrent Session 13: Microbial Manipulation of the Host II	Clyde Auditorium
13:50–15:50	Concurrent Session 14: Microbiome and Phytobiome II	Lomond Auditorium
13:50–15:50	Concurrent Session 15: Population Biology (Ecology, Genomics)	M1
15:50–16:20	Coffee Break	Hall 5
16:20–18:00	Plenary Session 6: The Impact of Translational Research	Clyde Auditorium
18:00–19:00	Poster Viewing with Authors Present (Session 2, Odds)	Hall 5
18:15–19:30	Flash Talks (Session 2)	Hall 5
19:00–20:00	Poster Viewing with Authors Present (Session 2, Evens)	Hall 5

## WEDNESDAY HIGHLIGHT

Young Investigator Awardee, sponsored by BASF

08:30–08:50 • Clyde Auditorium

### A Micro RNA Acts as a Systemic Mediator of Symbiotic Susceptibility

Speaker: Katharina Markmann, ZMBP, Tübingen University, Germany; Aarhus University, Denmark



Katharina Markmann received her doctoral training with Martin Parniske at the Sainsbury Laboratory in Norwich, UK, and at the Ludwig Maximilians University Munich in Germany. She proceeded to conduct postdoctoral studies with Jens Stougaard at Aarhus University, Denmark. Currently she is a group leader at the Centre for Plant Molecular Biology (ZMBP) in Tübingen, Germany, where her group is investigating the role of micro RNAs and their targets in the control of systemically regulated plant root responses, such as susceptibility of legume roots to mutualistic rhizobial bacteria.

## SCIENTIFIC SESSIONS

Scientific content listed in the program is as submitted by the authors/presenter and has NOT been edited.

### MORNING SESSIONS

#### Plenary Session 5

08:30–10:10, Clyde Auditorium

Moderator: Uta Paszkowski, University of Cambridge, U.K.

- 8:30 IS-MPMI Young Investigator Awardee, Sponsored by BASF: A micro RNA acts as a systemic mediator of symbiotic susceptibility  
K. MARKMANN, ZMBP, Tübingen University, Germany; Aarhus University, Denmark
- 8:55 The effectors of smut fungi: Who are they and what do they do?  
G. DOEHLEMANN, UNIVERSITY OF COLOGNE, GERMANY
- 9:20 Unrevealing the translational reprogramming of root cells during nitrogen fixing symbiosis  
M. E. ZANETTI, INSTITUTO DE BIOTECNOLOGÍA Y BIOLOGÍA MOLECULAR, UNLP AND CCT LA PLATA-CONICET, ARGENTINA
- 9:45 Beyond single genes: Receptor networks underpin plant immunity  
S. KAMOUN, THE SAINSBURY LABORATORY, UNIVERSITY OF EAST ANGLIA, NORWICH, U.K.

**Concurrent Session 10: Microbial Manipulation of the Host I**

10:40–12:40, Clyde Auditorium

Chairs: Gitta L. Coaker, University of California, Davis, U.S.A.; Suomeng Dong, Nanjing Agricultural University, China

- 10:40 Investigating host specificity and the role of core effector proteases for *Clavibacter* infection of tomato  
G. L. COAKER, University of California, Davis, U.S.A.
- 11:00 Molecular mechanisms of AvrPiz-t-Piz-t-mediated immunity against *Magnaporthe oryzae*  
Y. NING, Chinese Academy of Agricultural Sciences, China
- 11:20 A *Ralstonia solanacearum* TALE-like protein co-opts an ancient translational control element to boost host polyamine levels  
T. LAHAYE, Center for Plant Molecular Biology (ZMBP), Germany
- 11:40 From high-throughput functional screens to virulence mechanisms of *Phytophthora* plant pathogens  
S. DONG, Nanjing Agricultural University, China
- 12:00 A *Phytophthora* effector suppresses host-induced gene silencing mediated by secondary small RNAs  
W. MA, University of California, Riverside, U.S.A.
- 12:20 *Colletotrichum* metabolite higginsianin B suppresses plant jasmonate signalling by blocking proteasome-mediated degradation of JAZ proteins  
R. J. O'CONNELL, INRA-BIOGER, France

**Concurrent Session 11: Microbiome and Phytobiome I (Sponsored by the International Phytobiomes Alliance)**

10:40–12:40, Lomond Auditorium

Chairs: Alga Zuccaro, University of Cologne, Germany; Joy Bergelson, University of Chicago, U.S.A.

- 10:40 Plant immunity and cell death in fungal root symbiosis  
A. ZUCCARO, University of Cologne, Germany
- 11:00 Mapping barley genes shaping the rhizosphere bacteria  
C. M. ESCUDERO-MARTINEZ, University of Dundee, U.K.
- 11:20 The structure of the rice leaf microbiome is controlled by a complex host-microbe interplay  
R. OLIVA, International Rice Research Institute, Philippines
- 11:40 Isolation, characterization, and migrational patterns of bacterial endophytes during germination of *S. plicata* (Orchidaceae)  
S. DARLING-NOVAK, University of La Verne, U.S.A.
- 12:00 A genomic map of local adaptation to microbiota and potential pathobiota in *Arabidopsis thaliana*  
F. ROUX, LIPM, Université de Toulouse, INRA, CNRS, INPT, France
- 12:20 Soil-borne legacies of plant disease  
R. L. BERENDSEN, Utrecht University, Netherlands

**Concurrent Session 12: Systems Biology and Modelling**

10:40–12:40, M1

Chairs: Kenichi Tsuda, Max Planck Institute for Plant Breeding Research, Germany; Youssef Belkhadir, Gregor Mendel Institute of Molecular Plant Biology GmbH, Austria

- 10:40 Plant interactions with pathogenic and commensal bacteria  
K. TSUDA, Max Planck Institute for Plant Breeding Research, Germany
- 11:00 Low-Tech, Hi-Tech... PsyTEC? A systems-level probe of the plant-pathogen interface  
D. DESVEAUX, Centre for the Analysis of Genome Evolution and Function and University of Toronto, Canada
- 11:20 Network biology and predictive modeling to link genome to phenome  
S. MUKHTAR, University of Alabama at Birmingham, U.S.A.
- 11:40 TBD - Y Belkhadir Title  
Y. BELKHADIR, Gregor Mendel Institute of Molecular Plant Biology GmbH, Austria
- 12:00 Systematic discovery of antimicrobial proteins employed by the plant microbiome  
A. LEVY, The Hebrew University of Jerusalem, Israel
- 12:20 Identification and evolution of transcription factors that govern the biology of oomycete lifestyles  
S. DE VRIES, Dalhousie University, Canada

**AFTERNOON SESSIONS****Concurrent Session 13: Microbial Manipulation of the Host II**

13:50–15:50, Clyde Auditorium

Chairs: Peter N. Dodds, CSIRO Agriculture and Food, Australia; Renier A. L. Van Der Hoorn, University of Oxford, U.K.

- 13:50 Glycosidase and glycan polymorphism control hydrolytic release of immunogenic flagellin peptides  
R. A. L. VAN DER HOORN, University of Oxford, U.K.

- 14:10 A necrotrophic effector from *Parastagonospora nodorum* triggers programmed cell death by targeting two distinct non-homoeologous wheat sensitivity genes  
J. K. RICHARDS, Louisiana State University Agricultural Center, U.S.A.
- 14:30 Kilbournase, a protease-associated domain subtilase secreted by the fungal corn pathogen *Stenocarpella maydis*  
T. A. NAUMANN, USDA ARS NCAUR, U.S.A.
- 14:50 Using virulence mutants to identify *Avr* genes in the wheat stem rust fungus, *Puccinia graminis* f. sp. *tritici*  
P. N. DODDS, CSIRO Agriculture and Food, Australia
- 15:10 Escape from the battlefield: How *Colletotrichum higginsianum* uses plasmodesmata to establish an infection  
M. OHTSU, John Innes Centre, U.K.
- 15:30 The root endophyte *Serendipita vermifera* modulates extracellular nucleotide levels to transition from biotrophy to cell death-associated root colonization  
H. RÖVENICH, University of Cologne, Germany

#### Concurrent Session 14: Microbiome and Phytobiome II

13:50–15:50, Lomond Auditorium

Chairs: Jan E. Leach, Colorado State University, U.S.A.; Soledad Sacristan, Universidad Politécnica de Madrid, Spain

- 13:50 A fundamental role of microbiota in age-dependent immunity  
B. C. PAASCH, Michigan State University, U.S.A.
- 14:10 Microbe-associated molecular patterns and endophytic microbiome assembly in *Arabidopsis thaliana*  
C. OLDSTONE-JACKSON, University of Chicago, U.S.A.
- 14:30 Rice plants coordinate root microbiome for nutrient utilization and proper growth in the field  
Y. BAI, Chinese Academy of Sciences, China
- 14:50 From the microbiome to the gene: Mapping the genes in a leaf microbiome responsible for strain-specific pathogenicity  
T. KARASOV, Max Planck Institute for Developmental Biology, Germany
- 15:10 Emerging roles of the root microbiota in balancing plant growth and defense for microbe-host homeostasis  
K. W. MA, Max Planck Institute for Plant Breeding Research, Germany
- 15:30 Spatially discrete micro-niches govern root microbiome assembly  
B. S. O'BANION, University of Tennessee, U.S.A.

#### Concurrent Session 15: Population Biology (Ecology, Genomics)

13:50–15:50, M1

Chairs: Eva H. Stukenbrock, Max Planck Institute for Evolutionary Biology, Germany; Daniel Croll, University of Neuchâtel, Switzerland

- 13:50 Recurrent hybridization introduces high genetic variability in crop pathogen  
E. H. STUKENBROCK, University of Kiel, Germany
- 14:10 A comparative population genomics approach to understand virulence in oat crown rust  
M. FIGUEROA, University of Minnesota, U.S.A.
- 14:30 The evolution of agrobacteria and their oncogenic plasmids  
J. H. CHANG, Oregon State University, U.S.A.
- 14:50 Parasites within parasites: How transposable elements drive the evolution of plant pathogenic fungi  
D. CROLL, University of Neuchâtel, Switzerland
- 15:10 Contrasting colonization and host range of *Sphingomonas* and *Pseudomonas* in wild *Arabidopsis thaliana* and neighboring plants  
D. S. LUNDBERG, Max Planck Institute for Developmental Biology, Germany
- 15:30 From mutation to population extinction: The butterfly effect of resistance breakdown in the poplar rust fungus *Melampsora larici-populina*  
A. PERSOONS, INRA, France

#### Plenary Session 6: The Impact of Translational Research

16:20–18:00, Clyde Auditorium

Moderator: Ingo Hein, The James Hutton Institute, University of Dundee, U.K.

- 16:20 Modelling and manipulating aphid-mediated plant virus transmission  
J. P. CARR, University of Cambridge, U.K.
- 16:40 New potato germplasm for resistance breeding and variety release in China  
H. LINDQVIST-KREUZE, International Potato Center (CIP), Peru
- 17:00 Understanding and exploiting genetic variation for disease resistance in wild wheat relatives  
B. B. WULFF, John Innes Centre, U.K.
- 17:20 Application of genetic modification and genome editing for developing disease resistant banana  
L. TRIPATHI, International Institute of Tropical Agriculture (IITA), Kenya
- 17:40 Extreme and durable resistance to late blight using genes from wild species transferred directly into farmer-preferred potato varieties  
M. GHISLAIN, International Potato Center (CIP), Kenya

# DAILY SCHEDULE AND SCIENTIFIC SESSIONS

All congress activities take place at the SEC unless otherwise noted.

## Thursday, July 18

08:00–15:00	Registration Open	Hall 5
08:00–16:00	Speaker Ready Room Open	Fyne
08:30–10:30	<b>Concurrent Session 16:</b> Cell Biology of Host-Microbe Interactions I	Clyde Auditorium
08:30–10:30	<b>Concurrent Session 17:</b> Symbiosis and Mutualism	Lomond Auditorium
08:30–10:30	<b>Concurrent Session 18:</b> Apoplastic interactions	M1
08:30–12:30	Exhibits Open	Hall 5
08:30–13:30	Poster Viewing (Session 2)	Hall 5
10:30–11:00	Coffee Break	Hall 5
11:00–13:00	<b>Concurrent Session 19:</b> Cell Biology of Host-Microbe Interactions II	Clyde Auditorium
11:00–13:00	<b>Concurrent Session 20:</b> Comparative Mutualist and Pathogen Studies	Lomond Auditorium
11:00–13:00	<b>Concurrent Session 21:</b> Invertebrate- (Nematode-/Insect-) Plant Interaction	M1
12:30–16:30	Exhibitor Take-Down	Hall 5
13:00–14:00	Lunch Break	Hall 5
13:00–14:00	Poster Take-Down (Session 2)	Hall 5
14:00–16:05	<b>Plenary Session 7</b>	Clyde Auditorium
16:05–16:30	Coffee Break	Clyde Auditorium
16:30–18:30	<b>Plenary Session 8 and Closing Ceremony</b>	Clyde Auditorium
19:30–22:00	<b>Congress Closing Cèilidh and Celebration</b>	Merchant Square (offsite)

## THURSDAY HIGHLIGHT

### Congress Closing Cèilidh and Celebration

19:30–22:00 • Merchant Square (offsite)

Don't miss the congress closing celebration, which will take place at Merchant Square, a spectacular venue in the heart of Glasgow. Attendees will be given vouchers that will allow them to choose foods and drinks from restaurants and bars of a wide range of styles. The event will close with a cèilidh (pronounced "KAY-lee"), a traditional Scottish gathering, to celebrate the end of the congress in friendship and great fun. *Attendees should arrange for their own transportation to and from the event. Public transportation and taxi services are located at the SEC. Please plan accordingly.*



Jeff Whyte / Shutterstock.com

## SCIENTIFIC SESSIONS

Scientific content listed in the program is as submitted by the authors/presenter and has NOT been edited.

### MORNING SESSIONS

#### Concurrent Session 16: Cell Biology of Host-Microbe Interactions I

8:30–10:30, Clyde Auditorium

Chairs: Silke Robatzek, The Sainsbury Laboratory, University of East Anglia, Norwich, U.K.; Christine Faulkner, John Innes Centre, U.K.

- 8:30 Specialisation of chitin signaling pathways at plasmodesmata  
C. FAULKNER, John Innes Centre, U.K.
- 8:50 Pathogen-induced acidification across the plasma membrane regulate the growth-defense balance of plants  
C. SANCHEZ-RODRIGUEZ, ETH Zürich, D-BIOL, IMPB, Switzerland
- 9:10 TBD - S Robatzek Title  
S. ROBATZEK, The Sainsbury Laboratory, University of East Anglia, Norwich, U.K.
- 9:30 Close proximity of the TIR domain of diverse plant intracellular immune receptor drives signalling activation from different cell compartments  
M. BERNOUX, INRA/CNRS, France; CSIRO Agriculture, Australia
- 9:50 Movement and propagation of 'Candidatus Liberibacter asiaticus' in its plant host and insect vector.  
A. LEVY, University of Florida, U.S.A.

### Concurrent Session 17: Symbiosis and Mutualism

8:30–10:30, *Lomond Auditorium*

Chairs: Myriam Charpentier, John Innes Centre, U.K.; Katharina Markmann, Aarhus University, Denmark

- 8:30 Activation of root legume endosymbioses program  
M. CHARPENTIER, John Innes Centre, U.K.
- 8:50 CAMTA1: A novel regulator of nodulation  
A. YAMAZAKI, RIKEN, Japan
- 9:10 Nutrient status regulates plant recognition of signals from beneficial microbes for promotion of symbiosis and suppression of immunity  
F. FENG, The Sainsbury Laboratory, Cambridge University, U.K.
- 9:30 Signalling and Nutrient in Plant-Microbe Symbioses  
E. WANG, Institute of Plant Physiology and Ecology, CAS, China
- 9:50 Evolution of the nitrogen-fixing root nodule symbiosis  
M. PARNISKE, University of Munich (LMU), Germany
- 10:10 Independent of arbuscular mycorrhizal symbiosis: Positional cloning and characterisation of a novel arbuscular mycorrhizal mutant in *Zea mays*  
B. MANLEY, University of Cambridge, U.K.

### Concurrent Session 18: Apoplastic interactions

8:30–10:30, *M1*

Chairs: Satoko Yoshida, RIKEN Center for Sustainable Resource Science, Japan; Guido Van Den Ackerveken, Utrecht University, Netherlands

- 8:30 Ethylene signaling mediates fine-tuning of host infection by parasitic plants  
S. YOSHIDA, NAIST and RIKEN Center for Sustainable Resource Science, Japan
- 8:50 Molecular interactions between *Fusarium graminearum* and host plants  
W. TANG, Shanghai Institute of Plant Physiology and Ecology, Chinese Academy of Sciences, China
- 9:10 Cleavage of bacterial MucD by plant secreted proteases in *Arabidopsis* immunity  
Y. WANG, Max Planck Institute for Plant Breeding Research, Germany
- 9:30 Apoplastic recognition of microbial Nep1-like proteins (NLPs) and subsequent signaling leading to plant immunity  
G. VAN DEN ACKERVEKEN, Utrecht University, Netherlands
- 9:50 Proline-rich extensin-like receptor kinases mediate damage-triggered immune responses to nematode infections  
J. L. LOZANO TORRES, Wageningen University and Research, Netherlands
- 10:10 Pattern recognition receptor complexes confer direct apoplastic resistance against bacterial water acquisition in plants  
S. YASUDA, NARA Institute of Science and Technology, Japan

### Concurrent Session 19: Cell Biology of Host-Microbe Interactions II

11:00–13:00, *Clyde Auditorium*

Chairs: Murray R. Grant, University of Warwick, U.K.; Savithamma P. Dinesh-Kumar, University of California, Davis, U.S.A.

- 11:00 The role of chloroplasts in disease and defence  
M. R. GRANT, University of Warwick, U.K.
- 11:20 The SYFO-mediated cell wall-plasma membrane-cytoskeleton continuum is required for symbiotic infections in *Medicago truncatula*  
P. LIANG, University of Freiburg, Germany
- 11:40 Revealing the unknown: The isoelectric point of proteins influences their translocation into the extrahaustorial matrix  
L. SMIGIELSKI, University of Copenhagen, Denmark
- 12:00 Inter-organellar communication during innate immunity  
S. P. DINESH-KUMAR, University of California, Davis, U.S.A.
- 12:20 The role and regulation of plastid targeting of AZI1, a key factor for systemic immunity  
D. J. SPEED, University of Chicago, U.S.A.
- 12:40 A hierarchical transcriptional network controls appressorium development in the rice blast fungus *Magnaporthe oryzae* in response to surface hydrophobicity  
M. OSES-RUIZ, The Sainsbury Laboratory, University of East Anglia, Norwich, U.K.

## Concurrent Session 20: Comparative Mutualist and Pathogen Studies

11:00–13:00, *Lomond Auditorium*

Chairs: Sebastian Schornack, The Sainsbury Laboratory, University of Cambridge, U.K.; Simona Radutoiu, Aarhus University, Denmark

- 11:00 Molecular determinants of symbiosis or defense identified in the model legume *Lotus japonicus*  
S. RADUTOIU, Aarhus University, Denmark
- 11:20 Evidence for host specificity within root-associated bacterial communities  
K. WIPPEL, Max Planck Institute for Plant Breeding Research, Germany
- 11:40 Calcium signalling in a compatible biotrophic oomycete-plant interaction  
F. Y. HWU, University of Munich (LMU), Germany
- 12:00 Spatially distinct sugar signatures along intracellular interfaces of filamentous microbes  
S. SCHORNACK, The Sainsbury Laboratory, University of Cambridge, U.K.
- 12:20 Convergent gain and loss of genomic islands drive lifestyle changes in plant-associated *Pseudomonas*  
R. A. MELNYK, University of California, Davis, U.S.A.
- 12:40 Distinct flavonoids in *Cicer arietinum* regulate positive and negative interactions with *Mesorhizobium ciceri* and *Meloidogyne javanica*  
J. L. P. NG, The Australian National University, Australia

## Concurrent Session 21: Invertebrate- (Nematode-/Insect-) Plant Interaction

11:00–13:00, *M1*

Chairs: Jorunn I. B. Bos, University of Dundee, U.K.; Sebastian Eves-van den Akker, University of Cambridge, U.K.

- 11:00 How do aphids promote plant susceptibility?  
J. I. B. BOS, University of Dundee, U.K.
- 11:20 Bacterially secreted defense peptide StPep1 stimulates root-knot nematode resistance in potato  
C. A. GLEASON, Washington State University, U.S.A.
- 11:40 A cyst nematode effector counteracts host immunity by directly binding redundant nodes in an NLR immune receptor network  
L. DEREVNINA, The Sainsbury Laboratory, University of East Anglia, Norwich, U.K.
- 12:00 Novel alpha-SNAP and NSF mechanisms mediate disease resistance against cyst nematodes  
A. F. BENT, University of Wisconsin, Madison, U.S.A.
- 12:20 Insect eggs trigger interplant systemic acquired resistance and enhanced insect performance  
Z. ORLOVSKIS, University of Lausanne, Switzerland
- 12:40 Revealing the “box” code: The spatial and temporal regulation of plant-parasitic nematode pathogenicity  
C. PELLEGRIN, University of Cambridge, U.K.

## AFTERNOON SESSIONS

---

### Plenary Session 7

14:00–16:05, *Clyde Auditorium*

Moderator: Katherine J. Denby, University of York, U.K.

- 14:00 Investigating the biology of invasive growth by the blast fungus *Magnaporthe oryzae*  
N. J. TALBOT, The Sainsbury Laboratory, U.K.
- 14:25 A novel strategy of preventing chitin-triggered plant immunity by fungal pathogen *Verticillium dahliae*  
H. S. GUO, Institute of Microbiology, Chinese Academy of Science, China
- 14:50 Effector biology of the vascular wilt fungus *Verticillium dahliae*  
B. P. H. J. THOMMA, Wageningen University, Netherlands
- 15:15 Regulation of NLR plant resistance protein levels through proteasome mediated degradation  
X. LI, University of British Columbia, Canada
- 15:40 Evolution of plant symbioses: From phylogenomics to functional validations  
P. M. DELAUX, LRSV UMR5546 CNRS/Université de Toulouse III, France

### Plenary Session 8 and Closing Ceremony

16:30–17:45, *Clyde Auditorium*

- 16:30 Precision in plant immune expression: Not lost in translation  
X. DONG, HHMI/Duke University, U.S.A.
- 17:15 IS-MPMI Closing Remarks
- 17:30 2021 Congress Invitation
- 17:35 Congress Conclusion

## TRAVEL AWARDS

### Congratulations to the 2019 IS-MPMI Travel Awardees!

IS-MPMI is pleased to announce the names of 70 individuals who received travel awards, totaling \$96,000 in support! Funds were provided by IS-MPMI and by the U.S. Department of Agriculture, National Institute of Food and Agriculture (USDA NIFA) and the National Science Foundation (NSF). Be sure to check out this student, post-doc, and early career talent during the congress and help support these future leaders in molecular plant-microbe interactions.

Andrew Armitage, *NIAB EMR*  
Korey Brownstein, *University of Chicago*  
Maria del Pilar Caro, *INSIBIO-CONICET-UNT*  
Claudia Alejandra Castro, *University of California, Riverside*  
Nuri Charoennit, *National University of Singapore*  
Nicholas R. Colaianni, *University of North Carolina, Chapel Hill*  
Khondoker M. G. Dastogeer, *Bangladesh Agricultural University*  
Sophie De Vries, *Dalhousie University*  
Sohini Deb, *CSIR-Centre for Cellular and Molecular Biology*  
Zoe Dubrow, *Cornell University*  
Anne Duncan, *Stanford University*  
Bardo A. Castro Esparza, *University of California, Davis*  
Citlali Fonseca, *Universidad Nacional Autónoma de México*  
Andrew D. Gloss, *University of Chicago*  
Michael R. Gomez, *University of California, Berkeley*  
Lais M. Granato, *Centro de Citricultura Sylvio Moreira/ Instituto Agrônomico*  
Corri Hamilton, *University of Wisconsin, Madison*  
Susanna Harris, *University of North Carolina, Chapel Hill*  
Janine Haueisen, *Environmental Genomics CAU Kiel and MPI Plön*  
Tyler Helmann, *University of California, Berkeley*  
Ariel Herrera-Vásquez, *Universidad Andrés Bello*  
Yiheng Hu, *Australian National University*  
Alejandra I. Huerta, *Colorado State University*  
Amit K. Jaiswal, *Purdue University*  
Martin Janda, *University of Chemistry and Technology Prague*  
Seongbeom Kim, *Seoul National University*  
Seomun Kwon, *Heinrich-Heine-Universität Düsseldorf*  
Bradley Laflamme, *University of Toronto*  
Asaf Levy, *The Hebrew University of Jerusalem*  
Feng Li, *University of Minnesota*  
Federica Locci, *Sapienza University of Rome*  
Kamal Kumar Malukani, *Centre for Cellular and Molecular Biology*  
Bethan Manley, *University of Cambridge*  
Rose Tafadzwa Masekesa, *University of Zimbabwe*  
Mamoru Matsumura, *Nagoya University*  
Mame Diarra Mbengue, *INRA*  
Kathryn McIntyre, *Colorado State University*  
Hannah M. McMillan, *Duke University*  
Amanda G. McRae, *University of California, Berkeley*  
Bharat Kumar Mishra, *University of Alabama, Birmingham*  
Diana Carolina Mazo Molina, *Cornell University*  
Maria A. Morel, *IIBCE*  
Jason Ng, *The Australian National University*  
Ntombikayise Precious Nkomo, *University of Pretoria*  
Bridget O'Banion, *University of Tennessee*  
Juan C. Ochoa, *Polish Academy of Science*  
Zigmunds Orlovskis, *University of Lausanne*  
Arturo Ortega, *University of California, Berkeley*  
Lorena B. Parra, *University of California, Davis*  
Christopher Peritore-Galve, *Cornell University*  
Sarah E. Pottinger, *Indiana University*  
Sivasubramanian Rajarammohan, *National Agri-Food Biotechnology Institute*  
Meenu Singla Rastogi, *IBENS*  
Mélanie K. Rich, *LRSV UMR5546 CNRS/Université de Toulouse III*  
Edward C. Rojas, *University of Copenhagen*  
Jose Rufian, *Shanghai Center for Plant Stress Biology*  
Mugdha Sabale, *University of Cordoba*  
Carol-Ann Crystal Segal, *University of Pretoria*  
Adam Todd Seroka, *Michigan State University*  
Lin-Jie Shu, *Technical University of Munich*  
Guy Sobol, *Tel Aviv University*  
DeQuantarius J. Speed, *University of Chicago*  
Yi-Chang Sung, *The Australian National University*  
Katalin Toth, *University of Missouri*  
Stephanie Van Wyk, *University of Pretoria*  
Valeria Velasquez-Zapata, *Iowa State University*  
Jaap-Jan Willig, *WUR*  
Silvia F. Zanini, *University of Giessen, JLU*  
Jeysika Zayas-Rivera, *University of Wisconsin, Madison*  
Yi Zhai, *University of California, Riverside*

# POSTERS

## Poster Schedule and Poster Titles by Category

Poster content listed in the program is as submitted by the authors/presenter and has NOT been edited. Taking photographs of material projected during presentations or displayed is prohibited without permission from the authors. Poster numbers, titles, and presenting authors are listed on the following pages.

Each poster should be placed on the corresponding numbers poster board during poster set-up time. Velcro will be provided on each board for attaching poster. Presenting authors must stand at their posters during their assigned times.

### POSTER SESSION 1

#### Sunday, July 14

08:30–15:30 Poster Set-Up (Session 1)

#### Monday, July 15

08:30–20:00 Poster Viewing (Session 1)

18:00–19:00 Poster Viewing with Authors Present (Session 1, Odds)

19:00–20:00 Poster Viewing with Authors Present (Session 1, Evens)

#### Tuesday, July 16

08:30–12:30 Poster Viewing (Session 1)

12:30–13:00 Poster Take-Down (Session 1)

#### TOPICS

#### Pages

Emerging and Re-Emerging Pathosystems .....	26
Emerging Topics in Plant-Microbe Interactions .....	27–31
Host-Microbe Co-Evolution .....	31–32
How the Environment Impacts Microbial Infection .....	32–34
Long-Distance/Systemic Signalling .....	34
Microbiome and Phytobiome .....	34–36
Molecular Recognition in Plant Immunity .....	36–42
Post-Translational Modifications and Their Control of Immunity .....	42–43

### POSTER SESSION 2

#### Tuesday, July 16

13:00–14:00 Poster Set-Up (Session 2)

#### Wednesday, July 17

08:30–20:00 Poster Viewing (Session 2)

18:00–19:00 Poster Viewing with Authors Present (Session 2, Odds)

19:00–20:00 Poster Viewing with Authors Present (Session 2, Evens)

#### Thursday, July 18

08:30–13:30 Poster Viewing (Session 2)

13:00–14:00 Poster Take-Down (Session 2)

#### TOPICS

#### Pages

Apoplastic interactions .....	43
Cell Biology of Host-Microbe Interactions .....	43–48
Comparative Mutualist and Pathogen Studies .....	48
Invertebrate- (Nematode-/Insect-) Plant Interactions .....	49–50
Microbial Manipulation of the Host .....	50–54
Population Biology, Ecology, and Genomics .....	54–56
Symbiosis and Mutualism .....	56–58
Systems Biology and Modelling Plant-Microbe Interactions .....	59



**NEW FOR 2019!**

To keep Hall 5 bursting with fresh content throughout the meeting, posters will be displayed in two sessions. Presenters have the opportunity to upload PDF versions of their posters to allow the research to be visible to all attendees through the app for the duration of the meeting. Upload instructions were sent to all presenting authors in June.



**MPMI Sponsoring Poster Awards**

During this year's Congress, MPMI is pleased to be sponsoring poster awards for five students. Posters will be reviewed onsite by the MPMI Editorial Board and by members of the IS-MPMI Board. Awardees will be announced and receive their award at the Closing Ceremony!

# FLASH TALK PRESENTATIONS

**NEW FOR  
THE 2019  
CONGRESS!**

Join in interactive discussions with poster presenters who were selected to prepare 3-minute Flash Talk presentations highlighting their research. All Flash Talks will take place in Hall 5.

*Flash Talk presenters who speak on Monday will have their posters on display in Poster Session 2, and presenters who speak on Wednesday will have their posters on display in Poster Session 1.*

## Flash Talks (Session 1)—Monday, July 15

18:15–19:30

### Apoplastic interactions

505-P2

508-P2

### Cell Biology of Host-Microbe Interactions

543-P2

546-P2

550-P2

561-P2

627-P2

### Comparative Mutualist and Pathogen Studies

665-P2

668-P2

### Invertebrate- (Nematode-/Insect-) Plant Interactions

701-P2

721-P2

### Microbial Manipulation of the Host

754-P2

764-P2

772-P2

836-P2

### Population Biology, Ecology, and Genomics

869-P2

1003-P2

### Symbiosis and Mutualism

919-P2

### Systems Biology and Modelling Plant-Microbe Interactions

968-P2

980-P2

## Flash Talks (Session 2)—Wednesday, July 17

18:15–19:30

### Emerging and Re-Emerging pathosystems

001-P1

008-P1

### Emerging Topics in Plant-Microbe Interactions

042-P1

101-P1

136-P1

### Host-Microbe Co-Evolution

160-P1

187-P1

### How the Environment Impacts Microbial Infection

202-P1

207-P1

### Long-Distance/Systemic Signalling

241-P1

243-P1

### Microbiome and Phytobiome

260-P1

261-P1

294-P1

### Molecular Recognition in Plant Immunity

338-P1

358-P1

434-P1

### Post-Translational Modifications and Their Control of Immunity

476-P1

## POSTER TITLES AND AUTHORS

### Emerging and Re-Emerging Pathosystems

- 001-P1 Contribution of a somatic hybridization event to the emergence of the Ug99 lineage of the wheat stem rust pathogen. F. LI, University of Minnesota, U.S.A.
- 004-P1 Understanding the molecular intricacies of rice-*Rhizoctonia solani* interactions. S. GHOSH, National Institute of Plant Genome Research, India
- 005-P1 Decoding the myrtle rust genome, the largest fungal genome (1 Gbp) sequenced to date. P. A. TOBIAS, University of Sydney, Australia
- 006-P1 Time-series transcriptome analysis of *Brachypodium distachyon* in response to infection by *Rhizoctonia solani*. Y. KOUZAI, RIKEN, Japan
- 007-P1 Functional and genomic characterization of a *Pseudomonas syringae* strain isolated from natural populations of *Arabidopsis* plants. A. HERRERA-VÁSQUEZ, Universidad Andres Bello, Chile; Fundación Instituto de Biología Integrativa, iBio, Chile
- 008-P1 Phytoplasma SAP11 effector homologs have evolved to differentially interact with plant TCP transcription factor subclasses. S. CAPDEVIELLE, John Innes Centre, U.K.
- 009-P1 An emerging new model system: The smut fungus *Thecaphora thlaspeos* infects Brassicaceae. V. GOEHRE, Heinrich-Heine University, Germany
- 010-P1 Good fungus, bad fungus: Interactions between barley and *Ramularia collo-cygni*. C. BURRELL, University of Edinburgh and Scotland's Rural College, U.K.
- 011-P1 Prevalence of mixed infection and putative facilitative interactions between blueberry viruses. M. L. FALL, Agriculture and Agri-Food Canada, Canada
- 012-P1 Characterization of expression profiles of effector genes of *Rhizoctonia solani* on *Brachypodium distachyon*. S. S. H. ABDELSALAM, Okayama Uni, Japan
- 013-P1 OchraVine control—Implementation of integrated and innovative management strategies to reduce the occurrence of ochratoxins along the vine value chain products: Grapes, raisins/currants and wine. D. I. TSITSIGIANNIS, Agricultural University of Athens, Greece
- 014-P1 Comparative genomics screen identifies MAMPs from '*Candidatus Liberibacter*' species that trigger immunity in citrus. J. D. LEWIS, USDA ARS, Plant Gene Expression Center, U.S.A.; University of California, Berkeley, U.S.A.
- 015-P1 The small RNA chaperone Hfq regulates quorum sensing and pathogenicity of *Pantoea ananatis*. B. KANG, Division of Applied Life Science (BK21 Plus), Gyeongsang National University, Korea, Republic of (South)
- 016-P1 Understanding the physiological and molecular components of elicitor-induced resistance in tomato against *Fusarium* wilt. S. L. CARMONA JR., Corporación Colombiana de Investigación Agropecuaria AGROSAVIA, Colombia
- 017-P1 *Pseudomonas syringae* evades phagocytosis by animal cells via type III effector-mediated regulation of actin filament plasticity. C. M. RYU, University of Science and Technology, Korea, Republic of (South); KRIBB, Korea, Republic of (South)
- 018-P1 Uncovering the secrets of success of *Phakopsora* spp. on crop plants. M. LOEHRER, RWTH Aachen University, Germany
- 019-P1 Genome analysis and effector repertoire of emerging *Fusarium oxysporum* pathogens. J. P. CLARKSON, University of Warwick, U.K.
- 020-P1 Unraveling the genetic determinism of barley resistance to root lesion nematodes. H. PIDON, Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Germany
- 021-P1 Lipopolysaccharide-induced plant defense priming against *Xylella fastidiosa* in *Vitis vinifera* grapevines. C. A. CASTRO, University of California, Riverside, U.S.A.
- 022-P1 Variation of barriers to geminivirus movement within vector body affects virus transmission. S. S. LIU, Institute of Insect Sciences, Zhejiang University, China
- 023-P1 *Cladosporium fulvum* Avr2 effector inhibits cysteine proteases secreted from its mycoparasite *Dicyma pulvinata*. Y. IIDA, National Agriculture and Food Research Organization, Japan
- 024-P1 First report of *Phomopsis fukushii* causing stem cankers and sudden death of young apple trees in Canada. P. A. ABBASI, Agriculture and Agri-Food Canada, Canada
- 025-P1 Detection and identification of a '*Candidatus Liberibacter*' species from ash tree infesting psyllids. F. O. WAMONJE, Department of Plant Sciences, University of Saskatchewan, Canada
- 1009-P1 The tomato spotted wilt virus (TSWV) genome is differentially processed in TSWV-infected resistant versus susceptible tomato (*Solanum lycopersicum*) cultivars. H. R. PAPPU, Washington State University, U.S.A.

---

## Emerging Topics in Plant-Microbe Interactions

- 026-P1 Gene duplication and mutation in the emergence of a novel aggressive allele of the AVR-Pik effector in the rice blast fungus. A. LONGYA, Kasetsart University, Thailand
- 028-P1 Host genotype-dependent interactions among pathogenic and commensal *Pseudomonas* strains in *A. thaliana*. O. SHALEV SKRIPTCHAK, Max Planck Institute for Developmental Biology, Germany
- 029-P1 Identification of candidate genes for resistance to lettuce downy mildew using Renseq k-mer association studies. L. B. PARRA, UC Davis-Genome center, U.S.A.
- 030-P1 Building the plant health profession. C. KNIGHT, Celia Knight Consulting Ltd, U.K.
- 031-P1 Phase variation in rice pathogen *Xanthomonas oryzae* pv. *oryzae*. V. N. MADHAVAN, CSIR-Centre for Cellular and Molecular Biology (CSIR-CCMB), India
- 032-P1 External RNA uptake by *Cercospora zeina* and *Exserohilum turcicum* and the possible development of RNA fungicides against maize yield limiting pathogens. I. MARAIS, Department Plant & Soil Sciences, FABI, University of Pretoria, South Africa
- 033-P1 Generation and characterization of tomato lines with CRISPR/Cas9-mediated mutations in 150 immunity-associated genes. N. ZHANG, Boyce Thompson Institute, U.S.A.
- 035-P1 Legume nodules: Are they new niches or/and traps for pathogens? C. BENEZECH, Laboratory of Plant-Microbe Interactions, France
- 036-P1 Induced and primed defence responses of *Fragaria vesca* against grey mold. R. BADMI, Biotechnology and Plant Health, Norwegian Institute of Bioeconomy Research, Norway
- 037-P1 Engineering synthetic plant-microbe signal communication in the rhizosphere. P. PARAMASIVAN, The Sainsbury Laboratory, U.K.
- 038-P1 Deciphering *Arabidopsis thaliana* responses to bacterial virulence factors of *Ralstonia solanacearum* through the study of natural variation of both biotic partners. N. S. RAZAVI EBRAHIMI, LIPM, Université de Toulouse, INRA, CNRS, INPT, Castanet-Tolosan, France
- 039-P1 Plant extracellular vesicles contain diverse small RNA species and are enriched in 10 to 17 nucleotide “tiny” RNAs. P. BALDRICH, Donald Danforth Plant Science Center, U.S.A.
- 040-P1 Understanding microbial life in total controlled environment agriculture: A knowledge transfer partnership. E. ERSKINE, James Hutton Institute, U.K.
- 041-P1 Genetic bases of natural variation of plant response to *Ralstonia solanacearum* under elevated temperature conditions. N. AOUN, INRA Occitanie-Toulouse, France
- 042-P1 *Burkholderia gladioli* strain NGJ1 deploys a prophage tail-like protein to feed on fungi. D. SWAIN, National Institute of Plant Genome Research, India
- 043-P1 Terpene synthases in *Trichoderma gamsii* T6085. I. V. MUÑOZ, University of Pisa, Italy
- 044-P1 Analysis of small RNA silencing in the interactions between wheat and an exclusively apoplastic fungal pathogen *Zymoseptoria tritici*. K. KANYUKA, Department of Biointeractions and Crop Protection, Rothamsted Research, U.K.
- 045-P1 Mutual potentiation of immune mechanisms triggered by cell surface and intracellular receptors. P. M. NGOU, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 046-P1 Identification of a SPI-1 type III secretion system from the plant-growth-promoting bacterium *Pseudomonas fluorescens* strain 2P24. H. L. WEI, Institute of Agricultural Resources and Regional Planning, CAAS, China
- 047-P1 Biosynthesis, hormonal regulation and antifungal activities of flavan-3-ols in poplar trees against the biotrophic rust fungus *Melampsora larici-populina*. C. ULLAH, Max Planck Institute for Chemical Ecology, Germany
- 048-P1 Searching for host resistance: Studying early potato stem response to *Dickeya* inoculation via RNA-seq. Y. LIU, Cornell University, U.S.A.
- 049-P1 Suppression of bacterial biofilm formation contributes to PAMP-triggered immunity in the *Arabidopsis-Pseudomonas syringae* pv. *tomato* interaction. R. K. CAMERON, McMaster University, Canada
- 050-P1 The rice CYP78A gene *BSR2* confers resistance to *Rhizoctonia solani* and affects seed size and growth speed in *Arabidopsis* and rice. M. MORI, NIAS, Japan
- 051-P1 Decipher regulation mechanism and evolutionary process of a pair of R proteins Pit-1 and Pit-2. Y. LI, Shanghai Center for Plant Stress Biology, Chinese Academy of Sciences, China
- 052-P1 Combinatorial biosynthesis of desmethyl-lasiodiplodin and its derivatives for new nematocide development. Y. XU, Biotechnology Research Institute, Chinese Academy of Agricultural Sciences, China
- 053-P1 Broad-spectrum fungal protection in transgenic *Arabidopsis* by the overexpression of an acyl-CoA-binding protein. M. L. CHYE, School of Biological Sciences, University of Hong Kong, Hong Kong
- 054-P1 Regulation of fungal effector gene expression during infection through chromatin dynamics. M. KRAMER, Wageningen University, Netherlands
- 055-P1 Involvement of jasmonates signaling pathway in watermelon-*Fusarium oxysporum* f. sp. *niveum* interactions. P. F. L. CHANG, IDCSCA Center and Department of Plant Pathology, National Chung Hsing University, Taiwan

## POSTERS

- 056-P1 **The surfactin and fengycin played an important role in biological ability of *Bacillus subtilis* NCD-2 against cotton damping-off.** P. MA, Plant Protection Institute, Hebei Academy of Agricultural & Forestry Sciences, China
- 057-P1 **Dual resistance of transgenic plants against Cymbidium mosaic virus and Odontoglossum ringspot virus.** T. Y. CHEN, Academia Sinica, Taiwan
- 058-P1 **Phylogenetic and phylogenomic approaches to decipher the evolution of the nitrogen fixing root nodule symbiosis.** J. KELLER, LRSV UMR5546 CNRS/Université de Toulouse III, France
- 059-P1 **The RNA-binding protein MOB7 is a novel negative regulator of plant immunity in *Arabidopsis thaliana*.** J. GEORGE, The Sainsbury Laboratory, University of East Anglia, U.K.; Institute of Plant and Microbial Biology, University of Zürich, Switzerland
- 060-P1 **A genome editing approach to establish de novo blast disease resistance in wheat.** S. PODDAR, Department of Molecular and Cell Biology, University of California, U.S.A.; Innovative Genomics Institute, University of California, U.S.A.
- 061-P1 ***Nicotiana benthamiana* Argonaute10 plays a proviral role in Bamboo mosaic virus infection.** Y. H. HSU, Graduate Institute of Biotechnology, National Chung Hsing University, Taiwan
- 062-P1 **Reconstitution of TIR-domain NLR cell death in tobacco by coevolved EDS1 family proteins with helper NLR NRG1 from *Arabidopsis*.** D. LAPIN, Max Planck Institute for Plant Breeding Research, Germany
- 063-P1 **ORA59 transcription factor positively regulates resistance to necrotrophic pathogens through binding to two distinct cis-acting elements in *Arabidopsis*.** Y. N. YANG, Department of Life Sciences, Korea University, Korea, Republic of (South)
- 064-P1 **Transcriptomic impact of the nitrogen fixing root symbiotic signalling pathway in the green lineage.** T. VERNIÉ, LRSV UMR5546 CNRS/Université de Toulouse III, France
- 065-P1 **Bacterial outer membrane vesicles: A new player in plant-microbe interactions.** O. BAHAR, ARO-Volcani Center, Israel
- 066-P1 **Sex mutants reveal components of Bs3-triggered immunity.** D. R. HOLMES, ZMBP, Germany
- 067-P1 **Uncoupling growth inhibition from plant immunity in the hyperresistant *dmr6 dlo1* mutant.** T. VAN BUTSELAAR, Utrecht University, Netherlands
- 068-P1 **Harnessing the diversity of biocontrol-related traits in plant-beneficial phenazine-producing *Pseudomonas* spp. to control potato diseases.** M. FILION, Université de Moncton, Canada
- 069-P1 **Sustained crop protection by surface functionalization.** C. LANGENBACH, RWTH Aachen University, Plant Physiology Department, Germany
- 070-P1 **Secondary metabolism pathway engineering for crop protection.** P. SCHWINGES, RWTH Aachen University, Plant Physiology Department, Germany
- 071-P1 **RNAi-based silencing of *Citrus sinensis* callose synthase 7, important gene to defense response to ‘*Candidatus Liberibacter asiaticus*’.** L. M. GRANATO, Centro de Citricultura Sylvio Moreira/Instituto Agrônomico, Brazil
- 072-P1 **Rhizosphere colonization by phytobeneficial phenazine-producing *Pseudomonas* spp.: A metabolic and genomic approach.** A. ZBORALSKI, Université de Moncton, Canada
- 073-P1 **The emerging case for epigenetic regulation of plant immunity.** J. TON, The University of Sheffield, U.K.
- 074-P1 **CRISPR/Cas9-mediated targeting of Cacao swollen shoot virus DNA.** M. A. GOMEZ, Innovative Genomics Institute, University of California, U.S.A.
- 075-P1 **Preliminary investigations of extracellular vesicles from the wheat pathogen *Zymoseptoria tritici*.** E. H. HILL, The Australian National University, Australia
- 076-P1 **Sucrose non-fermenting-1 related protein kinase 1 (GmSnRK1) play positive role in regulating the resistance to *Phytophthora sojae* in soybean.** X. ZHU, Shanghai Normal University, China
- 078-P1 **The WY domain in the *Phytophthora* effector PSR1 is required for virulence and RNA silencing suppression activity.** Y. QIAO, Shanghai Normal University, China
- 079-P1 ***Phytophthora sojae* effector suppresses RNA silencing and plant immunity by activating GmDCP2 mediated mRNA decay in soybean.** J. SHI, Shanghai Normal University, China
- 080-P1 **The role of cytokinin in plant pathogen interactions.** M. BAR, ARO, The Volcani Center, Israel
- 081-P1 **Induced proximity of a signaling domain on a plant-mammalian NLR chimera triggers defense activation in plants.** Z. DUXBURY, Gregor Mendel Institute, Austria
- 082-P1 **Ribonuclease-type effectors from *Colletotrichum orbiculare* potentiate host immune responses in a catalytic residue-dependent manner.** N. KUMAKURA, RIKEN Center for Sustainable Resource Science, Plant Immunity Research Group, Japan
- 083-P1 **Silencing genes in *Arabidopsis* downy mildew using exogenously applied small RNAs.** M. TOR, School of Science and the Environment, U.K.
- 084-P1 **From male-killers to plant pathogens? Investigating the capacity of insect-associated *Arsenophonus* symbionts to colonize plants.** J. DITTMER, Dipartimento di Scienze agrarie e ambientali (DISAA), University of Milan, Italy
- 085-P1 **Enhancement of growth and salt tolerance of rice by ACC deaminase-producing endophytic streptomycetes.** A. THAMCHAIPENET, Kasetsart University, Thailand

- 086-P1 **The impacts of quantitative disease resistance on downy mildew epidemiology in mixed host populations.** E. K. MOFFAT, The University of Sheffield, U.K.
- 087-P1 **Symbiotic nodules, the Achilles heel of legumes?** B. GOURION, Laboratory of Plant-Microbe Interactions, France
- 088-P1 **FtsH membrane protease genes of Flavescence dorée phytoplasma exhibit host-dependent differential expression in both natural and experimental pathosystems.** S. EVEILLARD, INRA Bordeaux, UMR 1332, France
- 089-P1 **A *Marchantia* transcription factor involved in both plant-pathogen interactions and development.** D. J. HOEY, The Sainsbury Laboratory, University of Cambridge, U.K.
- 090-P1 **Interplay of carbonic anhydrase activity and virulence in the plant pathogenic bacterium *Pseudomonas syringae* pv. *tomato*.** W. ZHANG, Cornell University, U.S.A.
- 091-P1 **High throughput phenotyping to optimize CRISPR/Cas9 mutation efficiency in cereal crops.** M. LENK, Institute of Biochemical Plant Pathology, Helmholtz Zentrum München, Germany
- 092-P1 **Identification of SEX (suppressor of executor) genes suggests shared immune signaling components of classical Bs1- and executor-type plant resistance proteins.** R. MORBITZER, ZMBP, Germany
- 093-P1 **A molecular toolkit for gene function studies using CRISPR/Cas in monocots and dicots.** V. NEKRASOV, Rothamsted Research, U.K.
- 094-P1 **Engineering disease resistance in crops by enhancing scopoletin production.** A. BEESLEY, RWTH Aachen University, Plant Physiology Department, Germany
- 095-P1 ***Arabidopsis* nonhost resistance-associated coumarin scopoletin provides plant protection.** S. F. BEYER, RWTH Aachen University, Plant Physiology Department, Germany
- 096-P1 **Uncovering novel peptide signaling molecules intrinsic to plant-microbe interactions in *Populus* by leveraging high-performance mass spectrometry, neural networks, and deep learning.** P. E. ABRAHAM, Oak Ridge National Laboratory, U.S.A.
- 097-P1 **Ebb and flow of vascular pathogenesis through repeated gain and loss of a molecular switch.** E. GLUCK-THALER, The Ohio State University, U.S.A.
- 098-P1 **The design of immune receptors RRS1/RPS4 with diverse integrated decoys to extend recognition capacity.** S. WANG, The Sainsbury Laboratory, U.K.
- 099-P1 **Host-induced silencing of *Aspergillus flavus* genes to control preharvest aflatoxin contamination in maize.** K. RAJASEKARAN, USDA, ARS, SRRC, U.S.A.
- 100-P1 **Near-saturation efficiency and novel counter-selection strategies for genome editing in *Arabidopsis* and *Nicotiana benthamiana*.** P. MARTIN, Martin Luther University, Germany
- 101-P1 **Dissecting the role of RNA-binding proteins in plant immunity.** M. BACH-PAGES, University of Oxford, U.K.
- 102-P1 **Novel sensor technology using capacitive micromachined ultrasonic transducers (CMUT) for rapid detection and interrogation of host-pathogen interactions.** R. A. DEAN, NC State University, U.S.A.
- 103-P1 **Functional analysis of proteins encoded by Ageratum leaf curl Sichuan virus.** L. QING, Southwest University, China; Southwest University, China
- 104-P1 **Regulation of a geminivirus late gene promoter by PRC2.** G. SUNTER, University of Texas at San Antonio, U.S.A.
- 105-P1 **Non-integrative viral-delivery system for plant genome editing by CRISPR/Cas9.** J. KIM, Department of Plant Science, Seoul National University, Korea, Republic of (South); Plant Immunity Research Center, Korea, Republic of (South)
- 106-P1 **Plant extracellular vesicles interact with pathogenic fungi and can alter their morphology and gene expression.** B. D. RUTTER, Indiana University, U.S.A.
- 107-P1 **Plant A20/ANI proteins play important roles in the SA-mediated antiviral immunity.** L. CHANG, Agricultural Biotechnology Research Center, Academia Sinica, Taiwan; Molecular and Biological Agricultural Sciences Program, Academia Sinica, Taiwan; Graduate Institute of Biotechnology, National Chung-Hsing University, Taiwan
- 108-P1 **Malvastrum yellow vein virus-encoded C4 protein promotes pathogenicity and disrupts host cell cycle.** L. QING, Southwest University, China
- 109-P1 **Two LSD1-like histone demethylases suppress immune response in *Arabidopsis*.** H. W. JUNG, Department of Applied Bioscience, Dong-A University, Korea, Republic of (South)
- 110-P1 **Mycoviruses infecting *Fusarium* species isolated from Ethiopian wheat fields and their potential association with hypovirulence of a *Fusarium* head blight fungus.** Y. MIZUTANI, Nagoya Univ., Japan
- 111-P1 **Three novel deoxynivalenol-degrading bacteria isolated from *Poaceae* planted soils in Japan.** H. MORIMURA, Nagoya Univ., Japan
- 112-P1 **Host-induced hairpin RNA-mediated gene silencing of Foc SGE1 for development of resistance against *Fusarium* wilt in banana.** R. F. LETCHUMANN, Queensland University of Technology, Australia
- 113-P1 **Plant genome editing using the CRISPR-Cas9 system to establish *bs5* resistance gene in tomato.** A. ORTEGA, University of California Berkeley, U.S.A.

## POSTERS

- 114-P1 **flg22-induced root growth-immunity trade-offs can be overcome by de-repression of cell cycle arrest.** R. EICHMANN, The University of Warwick, U.K.
- 115-P1 **Establishment of anthracnose disease resistance of maize by Cas endonuclease-mediated mutagenesis and host-induced gene silencing.** K. M. PATHI, Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Germany
- 116-P1 **Secondary metabolite expression could shape the biocontrol efficiency of *Pseudomonas* bacteria against plant parasitic nematodes.** S. CLOUGH, University of York, U.K.
- 117-P1 **Exploring the sound-modulated delay in tomato ripening through expression analysis of coding and non-coding RNAs.** C. M. RYU, University of Science and Technology, Korea, Republic of (South); KRIBB, Korea, Republic of (South)
- 119-P1 **Phenomics for plant quantitative disease resistance.** J. STASSEN, The University of Sheffield, U.K.
- 120-P1 **Functional analysis of Argonaute3 in *Phytophthora parasitica*.** J. XU, College of Plant Protection, Northwest A&F University, China
- 122-P1 **Odontoglossum ringspot virus replicase uncouples RNA silencing suppressor and replication activities in Cymbidium mosaic virus mixed-infection synergism.** S. C. LEE, Institute of Plant and Microbial Biology, Academia Sinica, Taiwan
- 123-P1 **Revealing how SA187 induces salt tolerance in the model organism *Arabidopsis thaliana*: Functional characterization of GWAS candidate.** H. ALZUBAIDY, King Abdullah University of Science and Technology, Saudi Arabia
- 124-P1 **Novel antibiotic producing bacteria from the phyllosphere of *Arabidopsis thaliana*.** S. QI, Gent university, Belgium
- 125-P1 **Double trouble, co-inoculation of potato with both the early and late blight pathogens.** S. M. BROUWER, Swedish University of Agricultural Sciences (SLU), Sweden
- 126-P1 **Ecological implications of microscopic leaf wetness on the phyllosphere.** N. KASHTAN, The Hebrew University of Jerusalem, Israel
- 127-P1 **Development of a flavonoid-responsive transcriptional biosensor.** L. H. CHAPPELL, University of Oxford, U.K.
- 128-P1 **Searching for circadian clock in *Hyaloperonospora arabidopsidis* that may regulate development and pathogenicity.** O. TELLI, School of Science and the Environment, U.K.
- 129-P1 ***Verticillium longisporum* induces SA-responsive gene expression in roots of *Arabidopsis thaliana* in the absence of SA.** L. ULRICH, Georg-August-University Göttingen, Germany
- 131-P1 **Influence of T6SS in temporal and spatial colonization of *Agrobacterium tumefaciens* during infection and tumorigenesis processes.** C. F. CHIEN, Institute of Plant-Microbe Biology (IPMB), Academia Sinica, Taiwan
- 132-P1 **Origin, expansion, and diversity of the NLR integrated domains in the grasses.** M. J. MOSCOU, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 133-P1 **The role of viral and oomycete suppressors of silencing in modulating plant defense.** R. R. VETUKURI, Swedish University of Agricultural Sciences, Sweden
- 134-P1 **Unveiling the role of LysM-RLKs in priming *Arabidopsis* defence responses against fungal pathogens.** M. GIOVANNONI, Sapienza University of Rome, Italy
- 135-P1 **Pathways involved in the *Arabidopsis* growth-defense trade off mediated by conditionally altered levels of cell wall-derived damage associated molecular patterns (DAMPs).** L. MARTI, Sapienza, University of Rome, Italy
- 136-P1 **Assessing the role of small RNAs in inter-kingdom communication during plant-bacterial interactions.** M. SINGLA RASTOGI, IBENS-CNRS UMR8197, France
- 137-P1 **Potato virus Y infection alters small RNA metabolism and immune responses in tomato.** F. CILLO, CNR - IPSP, Italy
- 139-P1 **S-acylation: A key regulator of the plant immune system.** C. H. HURST, University of Dundee, U.K.
- 140-P1 **Establishing a system to study cross-kingdom communication via extracellular vesicles between the crop plant *Hordeum vulgare* and the biotrophic fungus *Blumeria graminis* f. sp. *hordei*.** H. S. THIERON, RWTH Aachen University, Germany
- 141-P1 **A microbial fermentation-based elicitor primes wheat plants against powdery mildew.** A. TWAMLEY, University College Dublin (UCD); School of Agriculture and Food Science, UCD Earth institute, Ireland
- 142-P1 **Phenotypic heterogeneity in *Pseudomonas syringae*.** N. LOPEZ-PAGAN, University of Malaga, Spain
- 144-P1 **Identification and characterization of a dysbiosis mutant in *Arabidopsis*.** Y. T. CHENG, MSU-DOE Plant Research Laboratory, U.S.A.; Howard Hughes Medical Institute, U.S.A.
- 145-P1 **Applying recent developments in our understanding of Lr67 function to identify new sources of broad-spectrum disease resistance in cereals.** K. DIBLEY, CSIRO Agriculture and Food, Australia
- 146-P1 **Assessing the costs and benefits of chemical defence priming agents using emerging hyperspectral imaging technologies.** M. YASSIN, The University of Sheffield, U.K.
- 147-P1 **Integrated electrochemical Chip-on-Plant Biosensor for monitoring biotic and abiotic stress.** A. AVNI, Tel Aviv University, Israel

- 148-P1 **Structure vs. chemistry: Alternate mechanisms for controlling leaf microbiomes.** K. J. X. LAU, Nanyang Technological University, Singapore Centre for Environmental Life Sciences Engineering, Singapore
- 149-P1 **A pair of receptor-like proteins fine-tunes growth and immune signaling in *Arabidopsis*.** H. S. LEE, Gregor Mendel Institute, Austria
- 150-P1 **Effect of a fresh water algae, *Chlorella fusca* as a bio-stimulant on growth promoting and improving qualities of corn and leek in organic farming.** S. S. KIM, Wonju Agricultural Technology and Extension Center, Korea, Republic of (South)
- 151-P1 **Assessment of 12 domestic potato varieties resistant against common scab and late blight at five organic potato fields in Korea.** M. J. KIM, Organic Agricultural Division, National Institute of Agricultural Sciences, Korea, Republic of (South)
- 152-P1 **Characterization of Septoria leaf spot and stem canker of lowbush blueberry.** S. ALI, Agriculture and Agri-Food Canada, Canada
- 153-P1 **Engineering bacteriocin-mediated resistance against plant pathogenic bacteria in plants.** W. M. ROONEY, University of Glasgow, U.K.
- 154-P1 **Co-infection of OMMV and OLV-1 enhances symptoms and increases both viruses accumulation and viral derived siRNAs in plants.** P. MATERATSKI, ICAAM, University of Évora, Portugal
- 155-P1 **Isolate specific responses to the fungal pathogen *Zymoseptoria tritici* in wheat and *Brachypodium distachyon*.** A. FEECHAN, UCD, School of Agriculture and Food Science, UCD Earth institute, Ireland
- 156-P1 **Host induced gene silencing in *P. pachyrhizi* effectors interfere in virulence of soybean attenuating fungal pathogenicity.** F. C. MARCELINO-GUIMARAES, Embrapa Soybean, Brazil
- 157-P1 **PGPR-mediated modulation of the wheat microbiome.** P. CARRIL, Center for Ecology, Evolution and Environmental Changes, University of Lisbon, Portugal
- 158-P1 **Bacterial vesicles: Double agents for plant defense.** H. M. MCMILLAN, Duke University, U.S.A.
- 159-P1 **A DCL1-associated tRNA-derived small RNA is a potential positive regulator in *Arabidopsis* immunity.** H. G. KANG, Texas State University, U.S.A.
- 1002-P1 **An ancient and conserved regulation of lipid production allows carbon exchange in arbuscular mycorrhiza symbiosis.** M. K. RICH, LRSV UMR5546 CNRS/Université de Toulouse III, France
- 1010-P1 **Putative auxin and light responsive promoter elements from the Tomato spotted wilt virus genome are functional in *Arabidopsis*.** H. R. PAPPU, Washington State University, U.S.A.
- 1020-P1 **Development of a TYLCV resistance breeding system in tomato utilizing gene-specific molecular markers and infectivity assays.** I. YEAM, Andong National University, Korea, Republic of (South)
- 1025-P1 **DNA glycosylase MBD4L modulates chromatin structure in *Arabidopsis* infected tissues.** M. E. ALVAREZ, CIQUIBIC-CONICET, Universidad Nacional de Córdoba, Argentina

## Host-Microbe Co-Evolution

- 160-P1 **Rapid evolutionary adaptation of phytopathogenic powdery mildew fungi to highly selective plant environments.** S. KUSCH, RWTH Aachen University, Germany
- 162-P1 **Role of genetic and epigenetic modifications in the bacterial plant pathogen *Ralstonia solanacearum* during adaptation to the resistant tomato Hawaii 7996 plant.** R. GOPALAN NAIR, INRA, Université Toulouse III - Paul Sabatier, France
- 164-P1 **The impact of deployed resistances in agriculture on pathogen effector diversity.** I. HEIN, The James Hutton Institute/University of Dundee, U.K.
- 165-P1 **Glucosinolate detoxification in *Botrytis cinerea*.** M. LEVY, Plant Pathology and Microbiology Department, Hebrew University of Jerusalem, Israel
- 166-P1 **Phytoanticipin tolerance is critical for *Pantoea ananatis* virulence on onion.** S. P. STICE, University of Georgia, U.S.A.
- 168-P1 **A genetically unlinked NLR network that modulates plant immunity against diverse pathogens originated from an ancestral gene cluster.** C. H. WU, Institute of Plant and Microbial Biology, Academia Sinica, Taiwan
- 169-P1 **Virulence variation of *Acidovorax citrulli* isolates depending on inoculation sites in watermelon.** Y. SONG, Department of Horticultural Biotechnology, Kyung Hee University, Korea, Republic of (South)
- 170-P1 **Differential analysis of secondary metabolites of upland cotton line 91079-80 under the stress of *Verticillium dahliae*.** S. LI, Plant Protection Institute, Hebei Academy of Agricultural & Forestry Sciences, China
- 171-P1 **Profiles and characterization of *Clavibacter capsici* natural variants isolated from pepper plants during infection.** I. S. HWANG, Department of Horticultural Biotechnology, Kyung Hee University, Korea, Republic of (South)
- 172-P1 **Identification of *Clavibacter michiganensis* virulence genes via transposon mutagenesis.** I. S. HWANG, Department of Horticultural Biotechnology, Kyung Hee University, Korea, Republic of (South)
- 173-P1 **Effector adaptation in a host-specialized lineage of *Phytophthora*.** E. ZESS, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 174-P1 **Genomic mechanisms of pathogenic plasticity in *Phytophthora sojae*.** B. M. TYLER, Oregon State University, U.S.A.

## POSTERS

- 175-P1 Identification and characterization of revertants of the *dde2/ein2/pad4/sid2*-quadruple mutant, which exhibit disease resistance. S. ASAI, RIKEN Center for Sustainable Resource Science, Japan
- 176-P1 Recessive resistance to potyviruses in cucumber is determined by a single mutation in the *Vps4* gene. Y. IMURA, Nihon University, Japan
- 177-P1 Defining the putative minimal gene set required for host colonization by a fungal phytopathogen with an obligate biotrophic lifestyle—*Blumeria graminis* f. sp. *hordei*. M. BARSOUM, RWTH Aachen University, Germany
- 178-P1 Characterizing serine protease effectors from a vascular gram-positive tomato pathogen, *Clavibacter michiganensis*. D. M. STEVENS, University of California, U.S.A.
- 179-P1 *Magnaporthe oryzae* effector MoJII suppresses rice immunity by directly interacting with rice Ser/Thr protein phosphatase. H. KANG, Institute of Plant Protection, Chinese Academy of Agriculture Sciences, China
- 180-P1 Holistic investigation of the rice sheath blight disease. E. G. M. OREIRO, International Rice Research Institute, Philippines
- 181-P1 Role of soil pH in selection of root-nodule microsymbionts by nodulating legumes. N. TAK, Jai Narain Vyas University, Jodhpur, India
- 182-P1 Bacterial community composition shaped by variety and geographic distance in rice seeds. X. X. ZHANG, Institute of Agricultural Resources and Regional Planning, CAAS, China
- 183-P1 Adaptive evolution at a pathogen effector-host target binding interface is associated with host specificity. A. R. BENTHAM, John Innes Centre, Norwich Research Park, U.K.
- 184-P1 Genomic dissection of bacterial host specificity. D. S. GUTTMAN, Centre for the Analysis of Genome Evolution and Function, Canada; University of Toronto, Canada
- 185-P1 Identification and characterization of novel plant immune components using the *Arabidopsis*-powdery mildew pathosystem. Q. ZHANG, University of California, Berkeley, U.S.A.; University of Maryland, U.S.A.
- 186-P1 Diversity of TAL effectors from *Xanthomonas axonopodis* pv. *glycines* isolated in Korea. S. HEU, National Institute of Crop Science, RDA, Korea, Republic of (South)
- 187-P1 Genetic basis of host specificity to fungal rust pathogens in barley. Y. WANG, King Abdullah University of Science and Technology, Saudi Arabia; Wageningen University & Research, Netherlands
- 188-P1 BcCPDH1 is involved in the detoxification of sesquiterpenoid phytoalexin capsidiol, and specifically required for the pathogenicity of *Botrytis cinerea* on *Nicotiana* species. D. TAKEMOTO, Nagoya Univ., Japan
- 189-P1 The evolution of effectome-based strategies to establish beneficial symbiosis. R. OSBORNE, The University of Warwick, U.K.
- 190-P1 Excision of genomic island PPHGI-1 leads to broad changes in expression of island genes. J. D. PAYNE, University of the West of England, U.K.
- 191-P1 Highly dynamic effector clusters are involved in host adaptation of cereal powdery mildew. M. C. MÜLLER, University of Zurich, Switzerland
- 192-P1 A single cellobiosidase is required for barley hydathode and xylem colonization by *Xanthomonas translucens*. J. M. JACOBS, The Ohio State University, U.S.A.
- 193-P1 DNA double-strand breaks-mediated ectopic recombination between solo-long terminal repeats triggered pathogenic changes and genome rearrangement in the rice blast fungus. A. TAKAYUKI, Tokyo University of Science, Japan
- 194-P1 The relationships between *G. ambrosiae*, *G. circumfusum* and *G. spadiceum* and their hosts. S. LIU, Jilin Agricultural University, China; Jilin Agricultural University, China
- 842-P2 Evolution of pathogen resistance in wild tomato populations. R. STAM, Technische Universität München, Germany
- 1007-P1 Characterising *Solanum dulcamara* as a reservoir host of *Ralstonia solanacearum*. P. SEBASTIÀ MIRAVET, Center for Research in Agricultural Genomics, Spain

### How the Environment Impacts Microbial Infection

- 195-P1 Plant responses involved in cold temperature suppression of *Xylella fastidiosa* in grapevine. L. BURBANK, USDA-ARS, U.S.A.
- 196-P1 Successive subculture induced the degeneration of virulence and development on *Fusarium oxysporum* f. sp. *niveum*. T. H. CHANG, IDCSA Center and Department of Plant Pathology, National Chung Hsing University, Taiwan
- 197-P1 Homologs of the RNA binding protein RsmA in *Pseudomonas syringae* pv. *tomato* DC3000 exhibit function redundancy and are required for virulence. Y. ZHAO, University of Illinois, U.S.A.
- 198-P1 Resilience and sensitivity of pattern triggered immunity signaling pathways at elevated temperature in *Arabidopsis thaliana*. A. T. SEROKA, Michigan State University, U.S.A.
- 199-P1 Cytokinin-mediated processes promote heat-induced disease susceptibility of *Arabidopsis* to *Pseudomonas syringae* pv. *tomato* DC3000. A. M. SHIGENAGA, Colorado State University, U.S.A.
- 200-P1 Investigation of the impact of environmental air humidity on plant-pathogen interactions. L. YAO, Institute of Plant Physiology and Ecology, Chinese Academy of Sciences, China

- 201-P1 **The nature of drought stress drives differential metabolomic and endophytic responses in leaves of *Populus deltoides*.** T. TSCHAPLINSKI, Oak Ridge National Laboratory, U.S.A.
- 202-P1 **Defense responses against *Botrytis cinerea* are dampened by photoreceptor-controlled transcriptome changes in tomato.** S. COURBIER, Plant Ecophysiology, Department of Biology, Utrecht University, Netherlands
- 203-P1 **Disease incidence, severity and molecular characterization among field isolates of *Sphaceloma manihoti-cola* infecting cassava.** A. T. ALLEYNE, The University of the West Indies, Cave Hill Campus, Barbados
- 204-P1 **Gene expression dynamics of the obligate filamentous pathogen *Blumeria graminis* and its host plant under the field environments.** K. YOSHIDA, Graduate School of Agricultural Science, Kobe University, Japan; Japan Science and Technology Agency, Presto, Japan
- 205-P1 **Dissection of molecular events involved in signal perception and root infection by *Fusarium graminearum*.** Y. DING, Commonwealth Scientific and Industrial Research Organization, Australia
- 206-P1 ***Dickeya dadantii* in poorly drained soil causes sudden death of fruit trees.** T. FUJIKAWA, National Agriculture and Food Research Organization, Japan
- 207-P1 **Rain evokes a primitive plant immune response via trichome hair-like cell.** M. MATSUMURA, Division of Biological Science, Graduate School of Science, Nagoya University, Japan
- 208-P1 **Plant growth promoting under iron-deficiency mediated by the *Arabidopsis thaliana* bacterial root microbiota.** H. INOUE, NARO Institute of Agrobiological Sciences (NIAS), Japan; JST, PRESTO, Japan
- 209-P1 **The role of circadian entrainment in the outcome of rice blast infection.** C. D. GRIFFIN, University of Plymouth, U.K.
- 210-P1 **Stress, resistance and virulence of pectobacteria.** O. PETROVA, Kazan Institute of Biochemistry and Biophysics FRC “KSC of RAS”, Russian Federation
- 211-P1 **Cold priming memory reduces susceptibility to virulent pathogens and requires a functional plastid peroxidase system in *Arabidopsis thaliana*.** T. GRIEBEL, Dahlem Centre of Plant Science, Plant Physiology Group, Freie Universität, Germany
- 212-P1 **Investigating the effect of temperature on bacterial infections of bean.** J. I. O. PIAT, Doctoral Training Centre and Department of Plant Sciences, Oxford University, U.K.
- 213-P1 **Geographic dependence of the genetic architecture of resistance to leaf rust (*Puccinia novopanic*) in locally adapted ecotypes of the biofuel crop switchgrass (*Panicum virgatum*).** A. VANWALLENDAEL, Michigan State University, U.S.A.
- 214-P1 **Trehalose synthesis contributes to *Ralstonia solanacearum* fitness during bacterial wilt disease and outside the plant.** A. MACINTYRE, University of Wisconsin-Madison, U.S.A.
- 215-P1 **Disease progression in a field trial of transgenic bananas modified for resistance to banana bunchy top virus in Malawi.** J. L. DALE, Queensland University of Technology, Australia
- 216-P1 **An ABC transporter—Two component regulatory system locus is required for host metabolite-induced type III secretion by *Pseudomonas syringae* pv. *tomato* DC3000.** J. C. ANDERSON, Department of Botany and Plant Pathology, Oregon State University, U.S.A.
- 217-P1 **Plant-pathogen interactions in the halophytic crop species *Chenopodium quinoa*.** F. V. SCRAFTON, University of Oxford, U.K.
- 218-P1 **In search of genes required for *Paraburkholderia phymatum*'s high competitiveness in legume root infection.** G. PESSI, Department of Plant and Microbial Biology, University of Zurich, Switzerland
- 219-P1 **Hormetic pulsed UV light treatment induces plant defences and reduces *Botrytis cinerea* disease progression on tomato (*Solanum lycopersicum*).** M. PAPP-RUPAR, NIAB-EMR, U.K.; University of Nottingham, U.K.
- 220-P1 **Climate and host genotype jointly shape tree phenology, disease levels and insect attacks.** M. FATICOV, Stockholm University, Sweden
- 221-P1 **Investigating the circadian clock of *Verticillium dahliae* and its influence on pathogenicity.** E. CASCANT-LOPEZ, NIAB EMR, U.K.
- 222-P1 **Salmonella persistence in agricultural soil and ability to colonize plants vary in different soils and plant species.** A. SCHIKORA, Julius Kühn-Institut, Institute for Epidemiology and Pathogen Diagnostics, Germany
- 223-P1 **Establishment of a high throughput system for screening bacterial quorum sensing inhibitors.** L. Q. ZHANG, Department of Plant Pathology, China Agricultural University, China
- 224-P1 **Effects of fomesafen on soil enzyme activities, microbial population and its degradation in the rhizosphere soil of soybean.** H. HU, Institute of Agricultural Resources and Regional Planning, CAAS, China
- 225-P1 **Plant nitrogen supply affects *Arabidopsis thaliana* susceptibility to *Botrytis cinerea* and reveals novel virulence functions.** M. FAGARD, Institut Jean-Pierre Bourgin, INRA, AgroParisTech, CNRS, Université Paris-Saclay, France
- 226-P1 **Investigating the control of clock genes in *Verticillium dahliae*.** E. CASCANT-LOPEZ, NIAB EMR, U.K.
- 227-P1 **The effects of immune activation on clock and defence gene expression.** S. J. CARGILL, School of Biological Sciences, University of Edinburgh, U.K.
- 228-P1 **Characterizing the role *Ralstonia solanacearum*'s catabolic pathways play in pathogenesis in the xylem and root tomato environment.** C. HAMILTON, University of Wisconsin-Madison, U.S.A.

## POSTERS

- 229-P1 Seasonal changes affect the expression of ‘*Candidatus Liberibacter asiaticus*’ effectors and their citrus targets. V. ANCONA, Texas A&M Kingsville Citrus Center, U.S.A.
- 230-P1 Virulence characters of *Erwinia amylovora* and their variation under plant abiotic stress. R. JERIDI, Institut Jean-Pierre Bourgin, INRA, AgroParisTech, CNRS, Université Paris-Saclay, France
- 231-P1 Dissecting the disease triangle: Hosts, pathogens and the environment. R. BART, Donald Danforth Plant Science Center, U.S.A.
- 232-P1 The white collar complex and FREQUENCY drive pathogenesis in *Cercospora zeae-maydis*. B. H. BLUHM, University of Arkansas, U.S.A.

### Long-Distance/Systemic Signalling

- 233-P1 Evaluation and characterization of systemic resistance in forest trees: *Eucalyptus grandis* as a case study. S. K. FLEMINGTON, Forest Molecular Genetics Program, FABI, University of Pretoria., South Africa
- 234-P1 BABA and ABA: the relation between a novel (signaling?) molecule in plant defense and a classic plant hormone. F. STEFANELLI, University of Neuchatel, Switzerland
- 235-P1 Mutation of repressive NAC transcription factors as lead to pathogen resistance. M. PEREIRA MENDES, Plant-Microbe Interactions, Department of Biology, Utrecht University, Netherlands
- 236-P1 Rhamnolipids trigger induced-systemic resistance against *Botrytis cinerea* in *Arabidopsis thaliana*. M. TOUCHARD, Reims Champagne-Ardenne University, France
- 237-P1 Systemic acquired susceptibility caused by the fungal wheat pathogen *Zymoseptoria tritici*. H. SEYBOLD, Max Planck Institute for Evolutionary Biology, Germany; Environmental Genomics, Botanical Institute, University of Kiel, Germany
- 238-P1 Identification and characterization of small-molecular compounds that inhibit salicylic acid-mediated signaling pathway in *Arabidopsis*. N. ISHIHAMA, RIKEN Center for Sustainable Resource Science, Japan
- 239-P1 New insights to N-hydroxy-pipecolic acid induced defense priming across the plant kingdom. M. B. MUDGETT, Department of Biology, Stanford University, U.S.A.
- 240-P1 Long-distance transport factors of cucurbit-infected potyvirus. W. C. HU, NCHU, Taiwan
- 241-P1 Root-to-shoot signalling in mycorrhizal plants upon *Botrytis cinerea* infection. N. SANMARTÍN MARTÍNEZ, Universitat Jaume I, Spain
- 242-P1 Salicylic acid-driven association of LENRV and NIMIN1/NIMIN2 binding domain regions in the C-terminus of tobacco NPR1 transduces SAR signal. U. M. PFITZNER, Universität Hohenheim, Germany
- 243-P1 A look on the wild side of tomato plants to tackles biotic stresses. A. K. JAISWAL, Purdue University, U.S.A.
- 244-P1 *Chlorella fusca* primes systemic immunity against *Pseudomonas syringae* in *Arabidopsis*. S. M. LEE, KRIBB, Korea, Republic of (South); University of Science and Technology, Korea, Republic of (South)
- 245-P1 Evidence for volatile memory in plants: Boosting defence priming through the recurrent application of plant volatiles. C. M. RYU, University of Science and Technology, Korea, Republic of (South); KRIBB, Korea, Republic of (South)
- 246-P1 Alternation of WRKY62 and WRKY76 expression reprograms rice metabolism for defense. Z. GUO, China Agricultural University, China
- 1011-P1 Effect of extracellular ATP signaling on diverse plant pathogens. H. R. PAPPU, Washington State University, U.S.A.

### Microbiome and Phytobiome

- 247-P1 Bacterial diversity associated with the rhizosphere and endosphere of two halophytes: *Glaux maritima* and *Salicornia europaea*. K. YAMAMOTO, Department of Molecular Microbiology, Tokyo University of Agriculture, Japan
- 248-P1 Distinguishing nutrient-dependent plant driven bacterial colonization patterns in alfalfa. K. M. MOCCIA, University of Tennessee, U.S.A.
- 249-P1 The characteristics of microbiota cultivated potato (*Solanum tuberosum*) cv. Sumi in South Korea. G. BAK, Rural Development Administration, Korea, Republic of (South)
- 250-P1 Deciphering the influence of arbuscular mycorrhiza on the root exudate and microbiome of *Lotus japonicus*. G. STABL, Technical University of Munich (TUM) - Plant Genetics, Germany
- 251-P1 Inoculation of a microbial consortium for enhanced nutritional quality of maize (*Z. mays*) and potato (*S. tuberosum*) grown under field conditions. W. OVERBEEK, McGill University, Department of Plant Science, Canada
- 252-P1 Microbial consortia: A way to enhance crop yield under both controlled environment and field conditions. M. ANTAR, McGill University, Department of Plant Science, Canada
- 253-P1 Rhizosphere community selection reveals bacteria associated with reduced root disease. C. YIN, Washington State University, U.S.A.
- 254-P1 Comparisons of bacterial community between rhizosphere of potato in fields and the surface of potato tuber in storage. S. JEE, RDA, Korea, Republic of (South)

- 255-P1 **A citrus huanglongbing-associated microbiota has the capacity to metabolize sugars in the sieve elements.** K. FUJIWARA, National Agriculture and Food Research Organization, Japan
- 256-P1 **Species specificity of bacterial colonization and maintenance in the rhizosphere of *Arabidopsis thaliana*.** S. L. HARRIS, University of North Carolina, Chapel Hill, U.S.A.
- 257-P1 **Temporal dynamics of the sap microbiome of grapevine under high Pierce's disease pressure.** E. A. DEYETT, University of California Riverside, U.S.A.
- 258-P1 **Accumulation of agrocinopine-like substrate in *Ipomoea batatas*.** A. TANAKA, Nagoya University, Japan
- 259-P1 **Understanding the mechanisms by which root hair mutations alter the barley rhizosphere bacterial microbiota.** S. ROBERTSON, Plant Sciences, School of Life Sciences, University of Dundee, U.K.
- 260-P1 **Healthy wheat spikes microbiome contains fungi with biological control potential against Fusarium head blight.** E. C. ROJAS, University of Copenhagen, Denmark
- 261-P1 **Pathogen detection and beyond: Development and application of new sequence-based methods for characterisation of real-world microbial communities.** Y. HU, Research School of Biology, The Australian National University, Australia
- 262-P1 **Plant-microbiome interaction in tomato for disease response under defined soil condition.** K. CHOI, Dong-A University, Korea, Republic of (South)
- 263-P1 **Investigating the structure of the leaf and root microbiome of the wild strawberry *F. vesca*.** J. MITTELSTRASS, Universität Zürich, Switzerland
- 264-P1 **Investigating the virome of crops and trees using RNA-sequencing.** S. JONES, The James Hutton Institute, U.K.
- 265-P1 **Comparison of endophytes associated with the invasive weed, medusahead (*Taeniatherum caput-medusae*): Native range vs. introduced range.** C. DUNLAP, Crop Bioprotection Research Unit, U.S.A.
- 266-P1 **The International Alliance for Phytobiomes Research: Advancing international phytobiomes research for food security.** N. W. BREAKFIELD, NewLeaf Symbiotics, U.S.A.
- 267-P1 **Biocontrol activity of *Pantoea dispersa* against black rot disease of sweetpotato caused by *Ceratocystis fimbriata*.** J. LEE, Korea Research Institute of Bioscience and Biotechnology, Korea, Republic of (South)
- 268-P1 **Unveiling seed microbiotas as an archive of evolution of *Oryza*.** H. KIM, Department of Agricultural Biotechnology, Seoul National University, Korea, Republic of (South)
- 269-P1 **Impact of *Arabidopsis* immunity sectors on accommodation of a beneficial root endophyte in a community context.** C. UHLMANN, Max Planck Institute for Plant Breeding Research, Germany
- 270-P1 **Investigation of endosphere and rhizosphere microbial communities in kiwifruits plant.** G. CHO, Gyeongsang National University, Korea, Republic of (South)
- 271-P1 **Investigating the mycoparasitic interaction of *Pythium oligandrum* with a major phytopathogenic fungus, *Fusarium graminearum*.** C. FAURE, LRSV UMR5546 CNRS Université Toulouse III, France
- 272-P1 **Bacterial diversity in the rhizosphere of rice plant in response to nitrogen induced susceptibility to rice blast disease.** M. ROY, Yeungnam University, Korea, Republic of (South)
- 273-P1 **Microbiome-guided selection to identify plant growth-promoting bacteria that enhance juvenile maize growth under cold stress.** S. GOORMACHTIG, Ghent University-VIB, Belgium
- 276-P1 **Bacterial endophytes to protect plants against cold temperatures.** S. GARCIA MENDEZ, Laboratory of Microbiology University of Ghent, Belgium; VIB Plants Systems Biology, Belgium
- 277-P1 **Deciphering the modulation of compartment-specific microbiome during vascular wilt interaction by *Fusarium oxysporum* in tomato.** M. SABALE, University of Cordoba, Spain
- 278-P1 **Phytobeneficial traits under the control of multiple crosstalks belowground.** W. ACHOUAK, BIAM/LEMIRE UMR 7265 CNRS/CEA/Aix Marseille University, France
- 279-P1 **Targeting the phyllosphere microbiome to combat downy mildew disease.** P. GOOSSENS, Utrecht University, Netherlands
- 280-P1 **The role of secreted effectors in complex phyllosphere microbial communities.** K. EITZEN, University of Cologne, Germany; Max Planck Institute for Plant Breeding Research, Germany
- 281-P1 **Combined approaches to identify the incidence of *Zymoseptoria tritici* on microbial community in the wheat residues ecosystem.** V. LAVAL, INRA BIOGER, France
- 282-P1 **Fungal endophytes from wild plants induce resistance in commercial tomato plants against *Pseudomonas syringae*.** E. LLORENS, UNIVERSITAT JAUME I, Spain
- 283-P1 **Polyphasic analysis of a novel keystone species in the rhizosphere microbiome of tomato that contributes to bacterial wilt resistance.** S. K. KWON, Gyeongsang National University, Korea, Republic of (South)
- 284-P1 **Comparative metagenomic analysis of highly abundant *Pseudomonas* within the maize rhizosphere.** J. L. SUTTER, Max Planck Institute for Developmental Biology, Germany
- 285-P1 **The inconspicuous gatekeeper: Endophytic *Serendipita vermifera* acts as extended plant protection barrier in the rhizosphere.** L. K. MAHDI, University of Cologne, Germany
- 286-P1 **Microbial community dynamics associated with host phenological stages of *Citrus sinensis*.** N. A. GINNAN, University of California, U.S.A.
- 287-P1 **Absolute counts versus relative abundances in *A. thaliana* leaf bacterial networks.** H. WHITEHURST, University of Chicago, U.S.A.

## POSTERS

- 288-P1 **Selecting soybean-specific beneficial microbes for sustainable yield improvement.** S. VAN BENTUM, Plant-Microbe Interactions, Department of Biology, Utrecht University, Netherlands
- 289-P1 **The role of agricultural soil management practices in shaping the microbiome of *Sorghum bicolor*.** H. M. L. WIPF, University of California, Berkeley, U.S.A.
- 290-P1 **A tripartite ssDNA mycovirus of the family Genomoviridae isolated from a plant pathogenic fungus *Fusarium graminearum*.** L. GUO, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, China
- 291-P1 **Genomic and phenotypic characterization of novel rhizoplane and endophytic Verrucomicrobia reveal features for plant association.** B. REINHOLD-HUREK, University of Bremen, Germany
- 292-P1 **Field analyses for structural dynamics of rice associated microbiome.** Y. D. UTAMI, NARA Institute of Science and Technology, Japan
- 293-P1 **Exploring the effects of soybean genotype and environment on oomycete populations in Ohio using a microbiome approach.** K. A. NAVARRO, The Ohio State Univ, U.S.A.
- 294-P1 **The genes that shape the plant microbiome.** M. HORTON, University of Zurich, Switzerland
- 1018-P1 **Provenance, transmission and dynamics of bacteriomes and mycobiomes in *Arabidopsis*, *Brachypodium*, maize, wheat, rice, tomato, soy, cassava and 9 other important species of angiosperm plant.** D. JOHNSTON-MONJE, Universidad del Valle, Colombia; International Center for Tropical Agriculture, Colombia
- 1019-P1 **Back to the roots: Deciphering the taxonomic and functional diversity of the root microbiome of wild and modern tomato in the Ecuadorian Andes.** P. VAN 'T HOF, Universidad San Francisco de Quito–USFQ, Ecuador
- 1021-P1 **Plant immune components controlling growth and structure of the bacterial leaf microbiota.** S. PFEILMEIER, ETH Zürich, Switzerland

## Molecular Recognition in Plant Immunity

- 295-P1 **New plant-specific transcript factors interact with NLRs and regulates broad-spectrum blast resistance in rice.** Z. HE, Institute of Plant Physiology and Ecology, SIBS, CAS, China
- 297-P1 **Pathogen effector triggered plant immunity is modulated by light rhythm.** C. GAO, Nanjing Agricultural University, China
- 298-P1 **Chitin elicitor receptor kinase 1 (CERK1) signaling and sugar transporter (SWEET) gene expression in leaves and roots of *Brassica rapa* infected with *Plasmodiophora brassicae*.** M. H. OH, Chungnam National University, Korea, Republic of (South)
- 299-P1 **The inactivation of MdDIPM4 by CRISPR/Cas9 editing reduces the susceptibility of apple to fire blight disease.** V. POMPILI, Fondazione Edmund Mach, Italy
- 300-P1 **A receptor-like protein kinase in maize involved in jasmonic acid-mediated phytoalexin production in response to fungal pathogens.** A. K. BLOCK, USDA, ARS, CMAVE, U.S.A.
- 301-P1 **Transcriptional profiling and proteomic analysis on *MdCERK1* gene in apple root.** Y. ZHU, USDA ARS Tree Fruit Research Lab, U.S.A.
- 302-P1 **Multiple deletion mutation analysis of T3E effectors in *Ralstonia solanacearum*.** N. LEI, Kochi Univ, Japan
- 303-P1 **Better bait and faster traps: Optimizing the RPS5/PBS1 decoy system to enhance immune responses to turnip mosaic virus.** S. E. POTTINGER, Indiana University, U.S.A.
- 304-P1 **PUB4, a novel CERK1 interactor, positively regulates chitin-induced immune signaling.** Y. DESAKI, Department of Biological Science and Technology, Tokyo University of Science, Japan
- 305-P1 **Maize lectin receptor-like kinase associated with QTL for resistance to grey leaf spot disease identified by de novo assembly of transcriptomes.** D. K. BERGER, Department Plant & Soil Sciences, FABI, University of Pretoria, South Africa
- 306-P1 **Differential regulation of TNL-mediated immune signaling by redundant helper CNLs.** Z. WU, University of British Columbia, Canada
- 307-P1 **Effectors from *Alternaria solani* and evidence for a resistance gene in wild potato.** P. J. WOLTERS, Wageningen University and Research (WUR), Netherlands
- 309-P1 **Multiple MAMPs-triggered immune responses are mediated by BSRI, a rice RLCK, and enhanced by its overexpression, resulting in broad-spectrum disease resistance.** Y. KANDA, Tokyo University of Science, Japan; NIAS, Japan
- 310-P1 **Elucidating the function of the OseIL proteins in rice for rice sheath blight resistance.** X. WANG, Institute of Plant Protection, CAAS, China
- 311-P1 **Application of plant-immune biosensors for screening and discovery of Actinobacteria biocontrol candidates against necrotrophic fungal pathogens.** K. BELT, CSIRO Agriculture and Food, Australia
- 312-P1 **The involvement of pattern recognition receptors in *Caulobacter* sp. RHG1 induced growth promotion in *Arabidopsis thaliana*.** A. LAMPENS, Ghent University–VIB, Center for Plant Systems Biology, Belgium
- 313-P1 **Mitogen-activated protein kinase phosphatase 1 (MKP1) dependent changes of plasma membrane proteome during PAMP elicitation.** G. RUPP, University of Missouri, U.S.A.
- 314-P1 **Animal TIR domains inform the molecular and structural basis of signalling by plant NLR TIR domains.** B. KOBE, University of Queensland, Australia

- 315-P1 RNA-Seq transcriptome analysis reveals candidate genes involved in crown-rot (*Phytophthora cactorum*) resistance in strawberry (*Fragaria vesca*). A. GOGOI, Department of Plant Sciences, Norwegian University of Life Sciences (NMBU), Norway
- 316-P1 The *Arabidopsis* receptor-like kinase FERE is a crucial component of pattern-triggered immunity responses to *Fusarium* species. A. D. COLEMAN, Technical University of Munich, Germany
- 317-P1 Characterization and functional analysis of the Md-miR285N gene promoter in transgenic apple (*Malus x domestica*) and *Arabidopsis thaliana*. V. POMPILI, Fondazione Edmund Mach, Italy
- 318-P1 The *Citrus reticulata* CrRAP2.2 transcriptional factor shares similar functions to the *Arabidopsis* homologue and increases resistance to *Xylella fastidiosa*. A. A. DE SOUZA, Centro de Citricultura “Sylvio Moreira” – Agronomic Institute (IAC), Brazil
- 320-P1 The receptor-like cytoplasmic kinase BSK5 associates with immune receptors and is required for PTI. G. SESSA, Tel Aviv University, Israel
- 321-P1 Characterization of the molecular mechanism of action of the AsES elicitor protein in plant immunity. M. D. P. CARO, INSIBIO, CONICET-UNT, Argentina
- 324-P1 Coat protein of conserved structure from multiple potyviruses triggers Rysto-mediated immunity. M. GRECH-BARAN, Institute of Biochemistry and Biophysics, PAS, Poland
- 325-P1 A cysteine-rich receptor-like protein kinase is involved in CERK1-4 dependent cell death responses in *Arabidopsis*. C. TRIPPEL, Georg-August-University, Germany
- 326-P1 Dual functionality of a fungal LysM effector: Substrate sequestration and receptor complex perturbation? H. TIAN, Wageningen University & Research, Netherlands
- 327-P1 LysM-mediated elicitor recognition in the liverwort *Marchantia polymorpha*. H. NAKAGAMI, Max Planck Institute for Plant Breeding Research, Germany
- 328-P1 Plant autoimmunity activated by oligomerization of the atypical resistance protein RPW8/HR4 and NLR RPP7. L. LI, Max Planck Institute for Developmental Biology, Germany
- 329-P1 Putting yellow rust to BED: Elucidating the relationship between Yr7, Yr5 and YrSP. C. MARCHAL, John Innes Centre, U.K.
- 330-P1 Deciphering the sensing of rhamnolipid secretome by *Arabidopsis thaliana*. S. DOREY, Reims Champagne-Ardenne University, France
- 331-P1 OsWAKL21, a putative receptor of rice cell wall damage activates alternate signaling in rice and *Arabidopsis* to induce immunity. K. K. MALUKANI, CSIR-Centre for Cellular and Molecular Biology (CSIR-CCMB), India
- 332-P1 Effector-dependent interactions between RRS1 N- and C- terminal domains are required for RPS4/RRS1 derepression. H. GUO, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 333-P1 Structural and functional analysis of LORE-dependent 3-hydroxy fatty acid immune sensing in Brassicaceae. L. J. SHU, Technical University of Munich, Germany
- 334-P1 The *Ptr1* locus in *Solanum lycopersicoides* confers resistance to race 1 strains of *Pseudomonas syringae* pv. *tomato* and to *Ralstonia pseudosolanacearum* by recognizing type III effectors AvrRpt2/RipBN. D. C. MAZO-MOLINA, School of Integrative Plant Science, Cornell University, U.S.A.
- 335-P1 Trans-(auto)phosphorylation events between SOBIR1 and BAK1 are required for immune signalling. M. H. JOOSTEN, Wageningen University, Netherlands
- 336-P1 Using natural variation in tomato to understand and improve the plant immune system. S. MAINIERO, Boyce Thompson Institute, U.S.A.
- 337-P1 An acetyltransferase effector HopZ5 activates RPM1 (resistance to *Pseudomonas syringae* pv. *maculicola* 1)-mediated defence responses in *Arabidopsis thaliana*. S. CHOI, POSTECH, Korea, Republic of (South)
- 338-P1 Molecular basis of effector recognition by independently evolved NLRs in distantly related plant species. M. PROKCHORCHIK, Pohang University of Science and Technology, Korea, Republic of (South)
- 339-P1 Lineage-specific pepper NRCs have roles in recognizing of multiple effectors of non-adapted pathogen *P. infestans*. S. OH, Plant Immunity Research Center, Seoul National University, Korea, Republic of (South)
- 340-P1 Global identification and transcriptional co-regulation analysis of receptor-like protein genes in pepper. W. H. KANG, Gyeongsang National University, Korea, Republic of (South)
- 341-P1 OsAPXs regulate the response to *Xanthomonas* (*Xoo*) infection in rice. Y. WANG, Temasek Life Sciences Laboratory, Singapore
- 342-P1 A rice OsAGO18-interacted helicase OsHRQ1 promotes virus infection in plants. K. XU, Peking University, China
- 343-P1 The type III effectors of *Ralstonia solanacearum* interact with tobacco chloroplastic proteins. K. OHNISHI, Kochi Univ, Japan
- 344-P1 The LRR-RLK REAL1 is a novel component of PRR complex that negatively regulates PAMP-triggered immunity in *Arabidopsis*. Y. GOTO, RIKEN Center for Sustainable Resource Science, Plant Immunity Research Group, Japan; The University of Tokyo, Japan
- 345-P1 Structural and biochemical study of DANGEROUS MIX pairs in *Arabidopsis thaliana*. N. CHAROEN-NIT, National University of Singapore, Singapore

## POSTERS

- 346-P1 **Effectors-assisted breeding approach for resistance to *Ralstonia solanacearum* in potato.** B. KIM, Seoul National University, Korea, Republic of (South)
- 347-P1 **Colonisation of *Arabidopsis* leaves by a *Streptomyces* sp. results in a protection against fungal diseases relying on plant immunity.** D. GAYRARD, CNRS/De Sangosse, France
- 348-P1 **Wheat pattern-triggered immunity against bacteria.** S. REN, University of Copenhagen, Denmark
- 349-P1 **Investigation of the physical interaction of *Arabidopsis thaliana* CERK1 and pathogen and circadian controlled 1 (PCC1).** B. SABELLECK, RWTH Aachen University, Germany
- 350-P1 **Investigating the mechanistic differences underlying the divergent immune response readouts of the FLAGELLIN SENSING 2 and FLAGELLIN SENSING 3 receptors in tomato.** R. ROBERTS, Boyce Thompson Institute, U.S.A.
- 351-P1 **A conserved peptide pattern from fungal endopolygalacturonase triggers plant immunity in *Arabidopsis*.** L. ZHANG, Centre for Plant Molecular Biology, Eberhard Karls University of Tübingen, Germany
- 352-P1 ***Arabidopsis* PAD4 lipase-like domain is sufficient for limiting green peach aphid infestation.** J. A. DONGUS, Max Planck Institute for Plant Breeding Research, Germany
- 353-P1 **Connecting structure to function: How NRG1 helps signal in immunity.** J. M. FEEHAN, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 355-P1 **1,001 ways of detecting danger—Activation of a secreted decoy signal by a bacterial protease.** L. P. MAIER, Center for Plant Molecular Biology (ZMBP), Tübingen University, Germany
- 356-P1 **An over-excited FLS2.** Y. WANG, Center for Plant Molecular Biology (ZMBP), Tübingen University, Germany
- 358-P1 **Structure-function analysis of ZAR1 immune receptor reveals key molecular interactions for activity.** M. BAUDIN, University of California, Berkeley, U.S.A.
- 359-P1 **Roles of the protein domains of the B-lectin S-domain receptor kinase LORE in oligomerization and immune signalling.** S. ESCHRIG, Technical University of Munich, Germany
- 360-P1 **Blast resistance gene *Pita-2* is allelic to Pi19 but not to Pita.** A. TAKAHASHI, Institute of Agrobiological Sciences, NARO, Japan
- 361-P1 **Investigation of regulating mechanism of the novel susceptibility factor RTP1 in plant resistance to *Phytophthora*.** X. LIU, College of Agronomy, Northwest A&F University, China
- 362-P1 **Characterization of autoimmunity triggered by DANGEROUS MIX pairs in *Arabidopsis thaliana*.** W. L. WAN, National University of Singapore, Singapore
- 363-P1 **The N-terminal coiled-coil domain of a subgroup of plant NLR immune receptor induces cell death.** H. Y. LEE, Plant Immunity Research Center, Seoul National University, Korea, Republic of (South)
- 364-P1 **Functional analysis of RIN4 natural variants reveals the essential properties for compatibility with NLRs.** K. H. SOHN, Pohang University of Science and Technology, Korea, Republic of (South)
- 365-P1 **Identification and analysis of RTP5, a susceptibility factor of *Arabidopsis thaliana* to *Phytophthora*.** W. LI, College of Plant Protection, Northwest A & F University, China
- 367-P1 **Screening wild tomato germplasm for resistance to race 2 of *Verticillium dahliae*.** J. VERMEULEN, Wageningen University, Netherlands
- 368-P1 **Exploring the role of RanGAP2 in recognition by the potato CC-NB-LRR immune receptors Rx1 and Gpa2.** O. SUKARTA, Laboratory of Nematology, Wageningen University and Research, Netherlands
- 369-P1 **Investigating the function of the tomato receptor-like cytoplasmic kinase BSK830 in PTI signaling.** G. SOBOL, Tel Aviv University, Israel
- 370-P1 **Genome-wide investigation for 2,4-diacetylphloroglucinol responsible genes in *Arabidopsis thaliana*.** D. CHAE, Gyeongsang National University, Korea, Republic of (South)
- 371-P1 **Fusarium and PRSV resistance genes in melon: Protein interactions and functional validation by CRISPR-Cas9.** R. PERL-TREVES, Bar Ilan University, Israel
- 372-P1 **Activation of heterotrimeric G proteins in *Arabidopsis* immune signaling.** M. MA, Chinese Academy of Science, IGDB, China
- 373-P1 **Interaction and structural study between plant TIR-containing NLRs and EDS1 immune regulatory complex.** M. X. RANK, University of Queensland, Australia
- 374-P1 **Elucidating the role of SOBIR1 and its signalling partners in plant immunity to microbial pathogens.** W. HUANG, Wageningen University, Netherlands
- 375-P1 **Partners and signalling in SOBIR1-related immune complexes.** S. LANDEO, Wageningen University, Netherlands
- 376-P1 **Analysis of downstream signalling components of LORE-mediated immune sensing in *Arabidopsis*.** L. RAASCH, Technical University of Munich, Germany
- 377-P1 **Signalling dynamics of the RRS1-RPS4 NLR immune complex at the chromatin during ETI.** E. GRUND, Laboratory of Plant-Microbe Interactions, INRA/CNRS, France
- 378-P1 **Grapevine (*Vitis vinifera*) receptor-like cytoplasmic kinases VvPBL27 and VvPBS1 connect chitin perception to MAPK activation.** R. ZHANG, Imperial College London, U.K.
- 379-P1 **A helper and sensor NLR pair focally accumulate at the host-pathogen interface to provide resistance to the Irish potato famine pathogen.** C. DUGGAN, Imperial College London, U.K.

- 380-P1 **The recognition of conserved RxLR effectors of *Phytophthora* species might help to defeat multiple oomycete diseases.** X. LIN, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 381-P1 **Identification of *Arabidopsis* LysM-type receptors involved in immune response induced by polymeric chitin.** H. KAMINAKA, Tottori University, Japan
- 382-P1 **From crystals to crops: Using effector targets to engineer novel immune receptors to combat rice blast disease.** J. H. MAIDMENT, John Innes Centre, U.K.
- 383-P1 **Identification of new *Cuscuta* derived factors.** M. KÖRNER, Eberhard Karls University, Tübingen, Germany
- 384-P1 **Molecular cues from *Cuscuta* their perception and effects on host plants.** P. SLABY, Eberhard Karls University Tübingen, Germany
- 385-P1 **Contrasting potato defense responses and *Phytophthora infestans* virulence between leaves and tubers.** A. LACAZE, Université de Moncton, Canada
- 386-P1 **A widely conserved N-terminal motif in the coiled-coil domain of NLR immune receptors is required for activation of hypersensitive cell death.** H. ADACHI, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 387-P1 **Widening the bottleneck: Strategies to enhance protein expression and purification of NLRs for structural studies.** N. MUKHI, John Innes Centre, Norwich Research Park, U.K.
- 388-P1 **A pair of rice NLR immune receptors work together via cooperation rather than negative regulation to initiate cell death.** R. ZDRZALEK, John Innes Centre, Norwich Research Park, U.K.
- 389-P1 **The potato nucleotide-binding leucine-rich repeat (NLR) immune receptor Rx1 regulates a multi-protein immune complex at chromatin.** M. J. CANN, School of Biological and Biomedical Sciences, Biophysical Sciences Institute, U.K.
- 390-P1 **What determines the composition of receptor complexes in nanodomains of the plasma membrane?** A. EHINGER, ZMBP, University of Tübingen, Germany
- 391-P1 **Peptides produced by different plants induce resistance against fungi in phylogenetically distant species.** J. PASTOR FERNÁNDEZ, Universitat Jaume I, Spain
- 392-P1 **Role of a LysM-domain containing protein in the virulence of a necrotrophic plant-pathogen fungus.** M. CRUMIÈRE, University Lyon 1, CNRS, INSA, BAYER, France
- 393-P1 **Evolutionarily distinct R proteins detect *Phytophthora infestans* effector PiAVR2 through its action on different target proteins.** H. WANG, The James Hutton Institute, U.K.
- 394-P1 **Identification of factors involved in foliar resistance to bacteria in potato.** D. A. HALTERMAN, USDA ARS, U.S.A.
- 395-P1 **Balanced nuclear and cytoplasmic distribution is required for activation of Gpa2-mediated resistance against potato cyst nematode *Globodera pallida*.** Q. ZHENG, Laboratory of Nematology, Wageningen University and Research, Netherlands
- 396-P1 **The role of RPW8 and RPW8-NLRs in plant immunity.** B. CASTEL, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 397-P1 **A natural stack of R genes maintains immunity in barley to non-adapted stripe rusts.** S. HOLDEN, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 398-P1 **Evidence for massive evasion of MAMP-triggered immunity in commensal bacteria.** N. R. COLAIANNI, UNC Chapel Hill Biology, U.S.A.
- 399-P1 **Could rice be a source of cereal rust resistance genes?** Z. MA, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 400-P1 **Regulation of PAMP-induced transcriptional reprogramming by the active DNA demethylase ROS1.** T. HALTER, IBENS, France
- 401-P1 **ABC transporter RaxB is required for processing and secretion of sulfated RaxX to yield a biologically active form that resembles a plant hormone peptide.** A. JOE, University of California Davis, U.S.A.
- 402-P1 **New insights into the role of a pseudokinase in stomatal immunity.** A. GUZMAN, Department of Biology, Stanford University, U.S.A.
- 403-P1 **Overexpression of the NBS-LRR receptor from *N. benthamiana* confers resistance to HLB bacteria in transgenic citrus.** Y. DUAN, USDA ARS, U.S.A.
- 404-P1 **Genome editing SINRC4a results in broad-spectrum pathogen-resistance in tomato.** A. AVNI, Tel Aviv University, Israel
- 405-P1 **Molecular resistance mechanisms during plant-plant interactions.** M. ALBERT, University of Tübingen, Germany
- 406-P1 **Whole genome sequencing reveals an NLR-rich expansion at the Xo1 bacterial leaf streak resistance locus in Carolina Gold Select rice and identifies an Xo1 candidate.** A. READ, Cornell University, U.S.A.
- 407-P1 **Signaling in resistance mediated by TIR-type NLR receptors in *Nicotiana benthamiana*.** J. STUTTMANN, Martin Luther University, Germany
- 408-P1 **The plasma membrane-associated Ca<sup>2+</sup>-binding protein PCAP1 plays a role in immunity and response to elicitors.** B. MATTEI, University of LAquila, Italy

## POSTERS

- 409-P1 Perception of microbial features by the citrus innate immune system. T. TORUNO, University of California, U.S.A.
- 410-P1 A putative zinc-binding motif in the rice blast effector AVR-Pii contributes to a stable and functional conformation of the protein. K. FUJISAKI, Iwate Biotechnology Research Center, Japan
- 411-P1 Phosphorylation-dependent sub-functionalization of the calcium-dependent protein kinase CPK28. M. BREDOW, Queen's University, Canada
- 412-P1 Plant recognition of *Phytophthora* PAMP XEG1. Y. WANG, Nanjing Agricultural University, China
- 413-P1 Self-association and an intact NADase active site are required for plant TIR domain immune signalling. J. CHEN, Commonwealth Scientific and Industrial Research Organisation, Australia
- 414-P1 Identification of potato genotypes responsive to *Phytophthora infestans* effector gene Avr3aEM. J. LI, College of Plant Protection, Northwest A & F University, China
- 415-P1 High-throughput functional analysis of *Phytophthora infestans* effectors in non-host plant immunity. S. LEE, Department of Plant Science, Seoul National University, Korea, Republic of (South)
- 416-P1 Identification and characterization of putative effectors from *Ascochyta lentis*. B. M. HENARES, Centre for Crop and Disease Management, Curtin University, Australia
- 417-P1 Multiple knock-outs of NLRs using CRISPR-Cas9 mediated mutagenesis in *Arabidopsis* and a functional test with abiotic stresses. S. T. KIM, Institute for Basic Science, Korea, Republic of (South)
- 418-P1 MAPK involves in BSK1-mediated plant immunity in *Arabidopsis*. H. SHI, Fujian Agriculture and Forestry University, China
- 419-P1 Proteomic analysis of leaf epidermis inoculated with *Fusarium graminearum* in *Arabidopsis* ein3 mutant. D. TAMAOKI, Graduate School of Science and Engineering, University of Toyama, Japan
- 420-P1 Characterization of HopA1-triggered RPS6-mediated immune response. S. H. KIM, Gyeongsang National University, Korea, Republic of (South)
- 422-P1 Molecular mechanism of CPK5 regulates CaMBP involving in plant immunity. N. LIU, Fujian Agriculture and Forestry University, China
- 423-P1 Ethylene signaling negatively regulates the stomata movement by infection of *Fusarium graminearum*. D. IKEDA, Department of Biology, Faculty of science, University of Toyama, Japan
- 424-P1 Overexpression of *Nicotiana benthamiana* BAX inhibitor-1a suppress hypersensitive cell death in tobacco. H. Y. YOON, Department of Applied Biology, Chungnam National University, Korea, Republic of (South)
- 425-P1 Tomato I-2 homologues (I-2h) gene; a new partial resistance gene to *Fusarium* wilt disease. M. R. KIM, Department of Applied Biology, Chungnam National University, Korea, Republic of (South)
- 426-P1 The *xopJ6* gene encodes a PopP2-like acetyl transferase from *Xanthomonas campestris* pv. *campestris* recognized by RRS1/RPS4 R genes in *Arabidopsis*. L. D. NOEL, Université de Toulouse, LIPM, CNRS-INRA, France
- 427-P1 Development of SNP marker set related to ripe rot disease resistance in grapevine by GWAS. D. G. KIM, Department of Applied Biology, Chungnam National University, Korea, Republic of (South)
- 428-P1 Molecular and functional characterization of the plant immune receptor RLP32 and its ligand. K. FRÖHLICH, Centre for Plant Molecular Biology, Eberhard Karls University of Tübingen, Germany
- 429-P1 Multiple pathogen recognition at the Mla locus in barley. H. J. BRABHAM, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 430-P1 Searching for resistance genes against *Leptosphaeria maculans* late effectors, involved in systemic colonization of *Brassica napus*. A. JIQUEL, INRA BIOGER, France; Euralis Semences, France
- 431-P1 The function of the ToBRFV movement protein in the breakdown of Tm-2(2) resistance in tomato. Z. SPIEGELMAN, Agricultural Research Organization, The Volcani Center, Israel
- 432-P1 Proteomic study of plant leaf epidermis challenged with *Fusarium graminearum*. Y. SIDIQ, Graduate School of Natural Science and Technology, Kanazawa University, Japan
- 433-P1 What 'R' you doing here? Investigating the role of S-acylation in regulating plant disease resistance proteins. D. TURNBULL, University of Dundee, U.K.
- 434-P1 A novel family of mixed lineage kinase domain-like proteins mediates resistance to obligate biotrophic pathogens in plants. T. MAEKAWA, Max Planck Institute for Plant Breeding Research, Germany
- 435-P1 Effector-dependent changes in protein-protein interactions in the RPS4/RRS1 immune receptor complex. H. K. AHN, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 436-P1 Recognition of immunoactive compounds from rhizosphere bacteria in *Solanum pennellii*. M. BOEHME, Center for Plant Molecular Biology, Eberhard Karls University of Tübingen, Germany
- 437-P1 Molecular basis for ligand recognition specificity and activation of a plant NLR. M. HU, Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, China
- 438-P1 Tomato Sw-5b NLR immune receptor mediated recognition of tospovirus invasion. X. TAO, Nanjing Agricultural University, China
- 439-P1 Players and mechanisms in dsRNA-induced pattern-triggered immunity in plants. A. NIEHL, Julius Kühn-Institute, Institute for Epidemiology and Pathogen Diagnostics, Germany; Department of Environmental Sciences, Plant Physiology, University of Basel, Switzerland

- 440-P1 ***Arabidopsis* transcription factor RTP3 negatively regulates resistance against *Phytophthora parasitica*.** W. LU, College of Plant Protection, Northwest A&F University, China
- 441-P1 **Molecular mechanisms regulating race specific wheat-yellow rust interactions in winter wheat cultivars.** S. AKHTER, Department of Forest Mycology and Plant Pathology/ SLU, Sweden
- 442-P1 **Potential of *Pseudomonas* cyclic lipopeptides to control downy mildew in grapevine by induced resistance and direct antagonism.** L. HEYMAN, Ghent University, Belgium
- 443-P1 **ChIP-seq analysis of SA-responsive transcription cofactor NPR1 in *Arabidopsis thaliana*.** M. NOMOTO, Center for Gene Research, Nagoya University, Japan
- 444-P1 **Recognition of the type III effector HopF2a by the *Arabidopsis* resistance proteins ZAR1 and ZRK3.** D. SETO, University of Toronto, Canada
- 445-P1 **Further expansion of the ZAR1 Type III effector recognition profile through ZED1-related kinases.** A. MARTEL, University of Toronto, Canada
- 446-P1 **Unravelling the molecular basis of the cell death response of new allelic wheat NLR PM2 variants to powdery mildew effectors.** B. MANSER, University of Zurich, Switzerland
- 447-P1 **Dissecting  $\beta$ -glucan-triggered immunity in different plants.** A. WANKE, Max Planck Institute for Plant Breeding Research, Germany; University of Cologne, Germany
- 448-P1 **Homeostasis of cell wall-derived DAMPs is regulated through oxidation by Berberine-Bridge like proteins.** F. LOCCI, Sapienza, University of Rome, Italy
- 449-P1 **NLR-IDs: Windows into the hidden world of plant-pathogen interactions.** E. THYNNE, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 450-P1 **Towards the mechanistic understanding of immunity mediated by distinct resistance proteins in *Arabidopsis* against *Albugo candida*.** V. CEVIK, Department of Biology and Biochemistry, University of Bath, U.K.
- 451-P1 **Identification and cloning of disease resistance genes from wild barley using sequence capture and association genetics.** G. BETHKE, University of Minnesota, U.S.A.
- 452-P1 **Cloning new soybean cyst nematode resistance QTLs in soybean: Convergent evolution toward unusual SNAP and NSF processes.** J. ZAYAS-RIVERA, University of Wisconsin-Madison, U.S.A.
- 453-P1 **Recognition of herbivore-associated molecular patterns by a novel leucine-rich repeat receptor-like protein (LRR-RLP).** A. D. STEINBRENNER, University of Washington, U.S.A.; University of California San Diego, U.S.A.
- 454-P1 **Engineering a decoy substrate in soybean to enable recognition of the soybean mosaic virus NIa protease.** M. HELM, Indiana University, U.S.A.
- 455-P1 **R gene regulation mediated by miRNA/phasiRNA during plant defense response against *P. syringae*.** A. DEL-ESPINO, University of Malaga, Spain
- 457-P1 **Mapping of NLP recognition and immune response in *Brassica napus* by bulk-segregant analysis.** H. A. YALCIN, John Innes Centre, U.K.
- 458-P1 **Rice RPM1-like gene *OsRPL1* mediates in rice blast resistance.** X. CHEN, China Agricultural University, China
- 459-P1 **Involvement of miraculin-like protein genes in the coffee immune response to nematode.** D. FERNANDEZ, IRD-French Research Institute for Development, UMR IPME, IRD, Cirad, UM, France; Embrapa Genetic Resources and Biotechnology, Brazil
- 460-P1 **It pays to be different: A non-transcriptional TAL dependent resistance mechanism in rice.** A. I. HUERTA, Colorado State University, U.S.A.; Colorado State University, U.S.A.
- 461-P1 **Sugar transporters contribute to defense activation in *Arabidopsis*.** K. YAMADA, Max Planck Institute for Plant Breeding Research, Germany
- 462-P1 **Leaf rust induced, hypersensitive-like response in EMS mutated wheat.** J. P. FELLERS, USDA ARS, U.S.A.
- 463-P1 **Mechanistics of surfactin perception in plant immunity elicitation by *Bacillus*.** M. ONGENA, Liege University, Belgium
- 464-P1 **Structure-based study of the SR33 coiled-coil domain changes paradigms for coiled-coil self-association.** X. HU, The University of Queensland, Australia
- 465-P1 **Sweet orange expressing the immune receptor AtEFR is able to recognize and trigger immune defense responses against bacterial citrus diseases.** N. DE SOU.S.A. TEIXEIRA E SILVA, Sylvio Moreira Citrus Research Center, Agronomic Institute (IAC), Brazil
- 466-P1 **The plant immune system constrains bacterial attempts to remain motile while staying undetected.** K. PARYS, Gregor Mendel Institute, Austria
- 468-P1 **Rpp1 encodes an NBS-LRR protein with an integrated ubiquitin-like protease 1 (ULP1) domain that controls the immune response to *Phakopsora pachyrhizi*.** K. F. PEDLEY, USDA ARS FDWSRU, U.S.A.
- 469-P1 **Evolution of a guarded decoy protease and its receptor in Solanaceae.** J. KOURELIS, The Sainsbury Laboratory, U.K.; University of Oxford, U.K.
- 470-P1 ***Medicago truncatula* genes involved in resistance against Asian soybean rust confers partial resistance in soybean.** K. S. MYSORE, Noble Research Institute, U.S.A.

## POSTERS

- 471-P1 **Uncovering host adaptation of *Phytophthora cactorum* to strawberry and apple.** C. F. NELLIST, NIAB EMR, U.K.
- 1005-P1 **Phenotyping wheat mutants with enhanced disease resistance to *Puccinia striiformis* f. sp. *tritici*.** A. DEATKER, University of California Berkeley, U.S.A.; The Sainsbury Laboratory, U.K.
- 1015-P1 **EXORIBONUCLEASE 4 regulates MLA10 expression at post-transcriptional level to ensure proper immune responses in plants.** L. ZHAO, INSTITUTE OF GENETICS AND DEVELOPMENTAL BIOLOGY, CHINESE ACADEMY OF SCIENCES, China

### Post-Translational Modifications and Their Control of Immunity

- 473-P1 **Antagonistic functions of selective SUMO paralogs regulate innate immunity in *Arabidopsis thaliana*.** K. D. INGOLE, Regional Centre for Biotechnology, NCR Biotech Science Cluster, Faridabad, India
- 474-P1 **Ubiquitination meets phosphorylation to regulate cell death and innate immunity in rice.** G. L. WANG, Department of Plant Pathology, The Ohio State University, U.S.A.
- 475-P1 ***Arabidopsis* Histone Deacetylase 5 is required for *Pseudomonas*-induced deacetylation of histone H3 at lysine 9.** P. KIM, University of Nebraska, U.S.A.
- 476-P1 **A pathogen turns 'immunity on' to 'immunity off' with a flick of the switch.** Q. HE, Division of Plant Science, James Hutton Institute, University of Dundee, U.K.
- 477-P1 **Induction of autophagy requires MoPRMT1 methylation of MoSNP1 in *Magnaporthe oryzae*.** W. LIU, Inst of Plant Protection, CAAS, China
- 478-P1 **An acetyltransferase required for modulation of innate immunity in rice.** N. A. ESPINAS, RIKEN Center for Sustainable Resource Science, Japan
- 479-P1 **Quantitative phosphoproteomic analysis reveals common regulatory mechanisms between NLR- and PRR-triggered immunity in plants.** Y. KADOTA, RIKEN Center for Sustainable Resource Science, Plant Immunity Research Group, Japan; The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 480-P1 **SUMOylation is important for fungal development and pathogenicity in the rice blast fungus, *Magnaporthe oryzae*.** Y. J. LIM, Department of Agricultural Biotechnology, Seoul National University, Korea, Republic of (South)
- 482-P1 **Shining a light on the black box of effector-triggered immunity signaling.** S. L. JOHNSON, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 483-P1 **CDC48A protein level is regulated by SCF-SNIPER7.** K. AO, University of British Columbia, Canada
- 484-P1 **MAPK regulation of chromatin-associated factors during biotic stress in *Arabidopsis*: A phosphoproteomic approach.** A. SHEIKH, KAUST, Saudi Arabia
- 485-P1 **A ubiquitin E3 ligase regulatory cascade controls defence by modulating the abundance of an immune-suppressive RNA binding protein.** H. MCLELLAN, Division of Plant Science, James Hutton Institute, University of Dundee, U.K.
- 486-P1 **Multiple mechanisms regulate the degradation of steady-state and activated CNL immune receptor RPM1.** F. EL KASMI, Center for Plant Molecular Biology (ZMBP), University of Tübingen, Germany
- 487-P1 **A role for S-nitrosylation of the SUMO-conjugating enzyme, SCE1, in plant immunity.** G. J. LOAKE, University of Edinburgh, U.K.
- 488-P1 **The development of a transgenic sweet potato (variety Brondal) that is putatively resistant to Sweet potato feathery mottle virus (SPFMV) using the Coat protein method and the RNA interference method.** R. T. MASEKESA, University of Zimbabwe, Zimbabwe
- 489-P1 **Characterization of the *Pseudomonas syringae* (Psy) effector network.** K. BROWNSTEIN, University of Chicago, U.S.A.
- 490-P1 **The ubiquitin protein ligase (UPL) family regulates salicylic acid-dependent plant immunity.** Z. WANG, School of Biological Sciences, University of Edinburgh, U.K.
- 491-P1 **Chitosan oligosaccharides induce resistance to *Pseudomonas syringae* pv. *tomato* DC3000 in *Arabidopsis thaliana* via distinct N-glycosylation regulation pattern.** H. YIN, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China
- 492-P1 **Diverse ubiquitin chain linkage types orchestrate the immune response.** B. OROSA, School of Biological Sciences, University of Edinburgh, U.K.
- 493-P1 **Pathogen-inducible nucleoredoxin protects plant cells against oxidative stress.** J. R. BLEAU, School of Biological Sciences, University of Edinburgh, U.K.
- 494-P1 **Ribosome heterogeneity in the control of plant immunity.** Y. IZQUIERDO, National Centre of Biotechnology, Spain
- 496-P1 **Identification of a RING E3 ligase that regulates NADPH oxidase stability.** B. A. CASTRO ESPARZA, University of California, U.S.A.
- 497-P1 **Biotic stress modulation of protein acetylation revealed by acetylome profiling.** J. WALLEY, Iowa State University, U.S.A.
- 498-P1 **Involvement of phosphorylation in cucumovirus-*Nicotiana benthamiana* interaction.** A. OBREPALS-KA-STEPLOWSKA, Institute of Plant Protection - National Research Institute, Poland

- 1013-P1 Biochemical characterization of MLO2 in *Arabidopsis*. F. LEISSING, RWTH Aachen University, Germany  
 1014-P1 Site specific proteolytic processing—An irreversible contribution to plant immune signaling? A. PERRAR, Forschungszentrum Jülich, ZEA-3 Analytics, Germany

## Apoplastic interactions

- 499-P2 Exploring HIGS technology for reducing *Fusarium graminearum* infection in model and crop plants. A. K. MACHADO, Rothamsted Research, U.K.  
 500-P2 An insight into the apoplast of rice during *Rhizoctonia solani* AG1-IA infection. R. DATTA, Division of Plant Biology, Bose Institute, India  
 501-P2 Functional analysis of a *Cercospora zeina* effector using *Agrobacterium* transient assays. C. A. SEGAL, Department Plant & Soil Sciences, FABI, University of Pretoria, South Africa  
 502-P2 Discovery and characterisation of two novel necrosis-inducing effectors in *Fusarium graminearum*. C. H. WALKER, Rothamsted Research, U.K.  
 504-P2 Differential plant defense responses of lettuce genotypes against human pathogenic bacteria. C. JACOB, University of California, Davis, U.S.A.  
 505-P2 *Verticillium dahliae* effector SCP8 suppresses plant immunity activated by LRR-domain containing cell surface receptors. C. HUA, Centre for Plant Molecular Biology, Eberhard Karls University of Tübingen, Germany  
 506-P2 Pathogen induced pectin remodelling contributes to plant immunity. A. GUZHA, Department of Plant Biochemistry, University of Göttingen, Germany  
 507-P2 Mining and systematic analysis of the effector repertoire of *Ustilago hordei* during host colonization. B. OKMEN, University of Cologne, Germany  
 508-P2 Exploring apoplastic sulfate restriction as a component of pattern triggered immunity in *Arabidopsis thaliana*. A. H. LOVELACE, University of Georgia, U.S.A.  
 509-P2 A new class of race specific resistance genes from *Brassica napus* in the game of hide and seek with *Leptosphaeria maculans*. M. H. BORHAN, Agriculture and Agri-Food Canada, Canada  
 510-P2 Discovering effector proteins in necrotrophic fungal onion pathogens. M. B. F. STEENTJES, Wageningen University, Netherlands  
 511-P2 A *Sclerotinia sclerotiorum* effector protein specifically interacts with and negates the inhibitory effect of plant polygalacturonase-inhibiting protein (PGIP). W. CHEN, USDA ARS, Washington State University, U.S.A.  
 512-P2 Dissecting the molecular cross-talk between *Phytophthora*-plant in the apoplastic battlefield. Y. WANG, Nanjing Agricultural University, China  
 513-P2 Solanaceae-specific secretory peptide SAR8.2m is essential for non-host resistance of *Nicotiana benthamiana* to a variety of taxonomically distant *Phytophthora* species. S. IMANO, Nagoya Univ., Japan  
 514-P2 The role of *Rhynchosporium commune* effectors in colonisation of barley apoplast. A. O. AVROVA, James Hutton Institute, U.K.  
 515-P2 Proteome characterization of the cell wall, apoplast and extracellular space of sugarcane infected with *Sporisorium scitamineum*, the causal agent of smut disease. M. J. CALDERAN-RODRIGUES, “Luiz de Queiroz” College of Agriculture, University of São Paulo, Brazil  
 516-P2 Cysteine proteases and their inhibitors in microbe-maize root interactions. J. SCHULZE HÜYNCK, University of Cologne, Germany  
 518-P2 The lush life: *Escherichia coli* O157 colonising the apoplast. A. HOLMES, The James Hutton Institute, U.K.  
 519-P2 Functional analysis of a novel, in planta highly expressed, LysM effector of *Zymoseptoria tritici*. C. I. MACKENZIE, Wageningen University and Research, Netherlands; Corpus Christi College, University of Cambridge, U.K.  
 521-P2 An *Ustilaginoidea virens* protein SGAP1 acts as a PAMP to induce plant innate immunity. T. SONG, JAAS, China  
 522-P2 Photoaffinity profiling to unveil the role of metalloproteases in plant immunity. K. MORIMOTO, Department of Plant Sciences, University of Oxford, U.K.  
 1004-P2 Identifying the receptor of *Phytophthora* Pep-13/25 in *Solanum* species. Y. TORRES ASCURRA, Plant Breeding, Wageningen University and Research, Netherlands

## Cell Biology of Host-Microbe Interactions

- 524-P2 Global gene expression profiling of maize genes in defense responses to *Puccinia sorghi*. S. B. KIM, North Carolina State University, U.S.A.  
 525-P2 The SCAR/WAVE complex protein API controls the timely establishment of infection-conducive cell wall properties. A. GAVRIN, Cambridge University, U.K.  
 526-P2 Soybean stem canker caused by *Diaporthe phaseolorum* var. *caulivora*; colonization process and plant defense activation. E. MENA, Clemente Estable Research Institute, Uruguay

## POSTERS

- 527-P2 L-amino acid oxidase secreted by *Trichoderma* elicits systemic resistance by transporting to chloroplasts of host cells and targeting chlorophyll a/b binding proteins. K. C. LIN, Department of Life Science, National Dong Hwa University, Taiwan
- 528-P2 Role of chitosan and chitin deacetylases during development of *Ustilago maydis*. Y. S. RIZZI, Department of Organismic Interactions, Max Planck Institute for Terrestrial Microbiology, Germany
- 529-P2 Remorin: A membrane raft plasmodesmal protein limiting or promoting virus cell-to-cell movement of two distinct virus genera. S. GERMAN-RETANA, INRA, UMR BFP 1332, France
- 530-P2 Immune response induction in rice due to co-expression of XopQ and XopX. S. DEB, CSIR- Centre for Cellular and Molecular Biology, India
- 531-P2 Host-induced gene silencing of *Aspergillus flavus* p2c gene reduced aflatoxin contamination in field grown maize. Z. Y. CHEN, Louisiana State University AgCenter, U.S.A.
- 532-P2 Towards molecular mechanism for the functional activation of effector RipAY from *Ralstonia solanacearum*. S. RHEE, Seoul National University, Department of Agricultural Biotechnology, Korea, Republic of (South)
- 533-P2 TFV1 is preferentially expressed in plant infection phase and is required for full virulence of *Colletotrichum orbiculare* on cucurbit plants. R. ZHANG, Graduate School of Agriculture, Kyoto University, Japan
- 534-P2 Extracellular ribonucleases from *Ustilago maydis* contribute to the pathogenicity of the fungus. A. GHOSH, Division of Plant Biology, Bose Institute, India
- 535-P2 Nitric oxide and life in the xylem: How *Ralstonia solanacearum* uses a toxic metabolite to thrive in its host environment. C. G. HENDRICH, University of Wisconsin, Madison, U.S.A.
- 536-P2 Barley RIC157 is involved in RACB-mediated susceptibility to powdery mildew. S. ENGELHARDT, Phytopathology, TU Munich, Germany
- 537-P2 The role of Avr4 effector in *Cercospora cf. flagellaris* virulence, cercosporin biosynthesis, and infection of soybeans. Z. Y. CHEN, Louisiana State University AgCenter, U.S.A.
- 538-P2 *Fusarium graminearum* virus 1 ORF2 protein is required for suppression of RNAi by transcriptional repression of FgDICER-2 and FgAGO-1. J. YU, Plant Genomics and Breeding Institute, Seoul National University, Korea, Republic of (South)
- 539-P2 The roles of phytohormones in LsGRP1-mediated resistance against *Botrytis* pathogens. T. W. CHEN, Department of Plant Pathology and Microbiology, National Taiwan University, Taiwan
- 540-P2 Exploration of interaction between *Botrytis elliptica* subtilase and plant defense protein LsGRP1. T. C. LIN, National Taiwan University, Taiwan
- 541-P2 It's all in the delivery: Identifying and functionally characterising yellow rust effectors in wheat. C. JENSEN, John Innes Centre, U.K.
- 542-P2 Deregulated expression of E2Fa and E2Fb transcription factors hampered the cell cycle leading to reduced nematode-induced gall development. D. C. DO NASCIMENTO, INRA, Université Cote D'Azur, CNRS, UMR 1355-7254, France
- 543-P2 ROP INTERACTIVE PARTNER b (RIPb) supports penetration of barley by *Blumeria graminis* f. sp. *hordei*. C. MCCOLLUM, Technische Universität München, Germany
- 544-P2 Pathogen resistance mediated by modular dirigent-jacalin proteins are solely invented by monocots. U. SCHAFFRATH, RWTH Aachen University, Germany
- 545-P2 Highly branched ROP signalling acts in effector-triggered susceptibility to powdery mildew. R. HUECK-ELHOVEN, Technical University of Munich, Germany
- 546-P2 Uncovering cell specific immune responses in plants using the GFP-strand system. S. LOLLE, University of California, Davis, U.S.A.
- 547-P2 The gibberellic acid insensitive protein from *Nicotiana benthamiana* positively regulates Bamboo mosaic virus replication. C. H. TSAI, Graduate Institute of Biotechnology, National Chung Hsing University, Taiwan
- 548-P2 Plant class II glycine-rich protein LsGRP1 playing roles in defense-growth tradeoffs and disease resistance. C. H. LIN, National Taiwan University, Taiwan
- 549-P2 Live cell imaging of chitin induced callose deposition in *Arabidopsis*. M. KOHARI, Department of Life Sciences, School of Agriculture, Meiji University, Japan
- 550-P2 A protein complex formed by *Ustilago maydis* effectors is essential for virulence. N. LUDWIG, Max Planck Institute for Terrestrial Microbiology, Germany
- 551-P2 Differential nuclear dynamics underpin hyphal network organisation in a plant-pathogenic oomycete. E. EVANGELISTI, The Sainsbury Laboratory, Cambridge University (SLCU), U.K.
- 552-P2 Qualitative and quantitative analyses of the colonization characteristics of *Bacillus subtilis* NCD-2 on cotton root. Q. GUO, Plant Protection Institute, Hebei Academy of Agricultural & Forestry Sciences, China
- 553-P2 Root-knot nematodes induce cell cycle check point activation during parasitism on plant hosts. J. DE ALMEIDA-ENGLER, INRA, Université Cote D'Azur, CNRS, UMR 1355-7254, France
- 554-P2 A TnSeq approach to study the genetic bases of *Xanthomonas campestris* pv. *campestris* adaptation to in vitro and in planta conditions. J. S. LUNEAU, Université de Toulouse, LIPM, CNRS-INRA, France

- 555-P2 Investigating the role of the early wheat immune system to *Zymoseptoria tritici* fungi using bio-imaging approaches. F. VALENTE, University of Exeter, U.K.
- 556-P2 Who are you rooting for? Investigating *Phytophthora rubi* infection of raspberries. A. BEZANGER, The James Hutton Institute, U.K.
- 557-P2 A poplar rust effector protein associates with the *Arabidopsis* protein disulfide isomerase-11 to enhance plant susceptibility. M. H. MADINA, University of Quebec at Trois-Rivieres, Canada
- 558-P2 Rsv3 modulates abscisic acid defensive roles in the extreme resistance against soybean mosaic virus. M. ALAZEM, College of Agriculture and Life Sciences, Seoul National University, Korea, Republic of (South)
- 559-P2 JAZ4 functions as positive or negative regulator of jasmonate signaling in different *Arabidopsis* organs. L. DEMOTT, University of California, Davis, U.S.A.
- 560-P2 Chitin-deacetylase activity has important roles in inducing appressorium formation. S. SHOTA, Tokyo University of Science, Japan
- 561-P2 NbRLP1 plays a role in plant immunity toward the oomycete plant pathogen *Phytophthora parasitica*. Y. H. LI, National Taiwan University, Taiwan
- 562-P2 A small protein secreted by *Sclerotinia sclerotiorum* is a new necrosis-inducing effector that requires BAK1 and SOBIR1 for its activity. S. SEIFBARGHI, Agriculture and Agri-Food Canada, Canada; University of Saskatchewan, Canada
- 563-P2 A virulence-related protein produced by *Botrytis elliptica*. Y. J. WANG, National Taiwan University, Taiwan
- 564-P2 Immune signals at the endoplasmic reticulum (ER) control broad-spectrum acquired resistance. R. E. SCHWARZENBACHER, The University of Sheffield, U.K.
- 565-P2 OsWRKY10 is involved in defense signaling of rice to *Xanthomonas oryzae* pv. *oryzae*. D. J. HWANG, National Institute of agricultural science, Korea, Republic of (South)
- 566-P2 Analysis of type II secretion systems from *Xanthomonas campestris* pv. *vesicatoria*. S. DREHKOPF, Martin-Luther Universität, Germany
- 567-P2 Natural variation in AGO2 determines susceptibility to potexvirus and potyvirus but not to cucumovirus. A. ADUROGBANGBA, University of Sherbrooke, Canada
- 568-P2 Stealthy infections—*Pseudomonas syringae* AlgU downregulates flagellin expression, helping to minimize plant immune activation. B. SWINGLE, USDA-ARS and Cornell University, U.S.A.
- 569-P2 An efficient strategy for obtaining mutants by targeted gene deletion in *Ophiostoma novo-ulmi*. J. L. SARMIENTO VILLAMIL, Faculté de foresterie, de géographie et de géomatique, Université Laval, Canada
- 570-P2 A plant RabGAP negatively regulates autophagy and defence against the Irish potato famine pathogen *Phytophthora infestans*. A. Y. LEARY, Imperial College London, U.K.
- 571-P2 BAK1-based immunity controls hydathode colonization and vascular spread of *Xanthomonas campestris* pv. *campestris* in *Arabidopsis*. H. A. VAN DEN BURG, University of Amsterdam, Netherlands
- 572-P2 *Pseudomonas* mediates the crosstalk between autophagy and intracellular trafficking processes during plant immunity. P. B. GOUGUET, Universität Tübingen, Germany
- 573-P2 The fungal effector Mlp37347 unlock the gateway to intercellular trafficking. M. S. RAHMAN, University of Quebec at Trois-Rivieres, Canada
- 574-P2 Functional characterization of *Arabidopsis thaliana* macrophage migration inhibitory factor/D-dopa-chrome tautomerase-like (AtMDL) proteins and their potential to exert conserved cross-kingdom functions. K. GRUNER, RWTH Aachen University, Germany
- 575-P2 Tracking a cereal killer: How does *Fusarium graminearum* utilise the plasmodesmata to further infection? L. BAGGALEY, Rothamsted Research, U.K.
- 576-P2 How NorA and HmpX collaborate to protect *Ralstonia solanacearum* cellular machinery from plant and bacterial oxidative stress. A. N. TRUCHON, University of Wisconsin, Madison, U.S.A.
- 577-P2 Key region(s) of LsGRP1 for plant defense against grey mold. Y. R. LAI, National Taiwan University, Taiwan
- 578-P2 Lignin-deposited structural barrier prevents the spread of pathogens and confers resistance in *Arabidopsis*. M. H. LEE, Department of Life Sciences, Korea University, Korea, Republic of (South)
- 579-P2 Understanding the wheat Lr67 multipathogen resistance gene: A novel gain of function underpins resistance. R. MILNE, CSIRO Agriculture and Food, Australia
- 580-P2 A nuclear protein NbTFIISL from *Nicotiana benthamiana* is involved in the movement of Bamboo mosaic virus. L. Y. CHIU, Graduate Institute of Biotechnology, National Chung Hsing University, Taiwan
- 581-P2 Type II phosphatidate phosphatase gene CoPAP2 of *Colletotrichum orbiculare* is involved in fungal pathogenesis and host defense responses. S. KODAMA, Kyoto Prefectural University, Japan
- 582-P2 In planta transcriptome analyses reveal three novel core effectors of the cucumber anthracnose fungus, *Colletotrichum orbiculare*, essential for full virulence on Cucurbitaceae host plants. Y. INOUE, Graduate School of Agriculture, Kyoto University, Japan
- 583-P2 Identification and characterization of EFR-mediated immune signaling genes of *Arabidopsis* seedlings in response to *Agrobacterium* infection. C. J. LIN, Academia Sinica, Taiwan
- 584-P2 Mapping the tomato protein network exploited by type III effectors involved in bacterial wilt. J. J. R. DE RYCK, Ghent University-VIB, Belgium; ILVO, Belgium

## POSTERS

- 585-P2 ***Xanthomonas* type III effectors manipulate stromules.** J. L. ERICKSON, Department of Genetics, Martin Luther University, Germany
- 586-P2 **Identification of cellular pathways involved in the RACB-mediated susceptibility of barley towards the barley powdery mildew fungus *Blumeria graminis* f. sp. *hordei*.** L. WEISS, Phytopathology, TU Munich, Germany
- 587-P2 **Small secreted proteins of the root oomycete pathogen *Aphanomyces euteiches*, a new effector family targeting host nucleus.** L. CAMBORDE, LRSV UMR5546 CNRS Université Toulouse III, France
- 588-P2 **Detect, deploy, defend: Chloroplasts at the forefront of the host pathogen interface.** Z. SAVAGE, Imperial College London, U.K.
- 589-P2 **Dynamic chloroplast-nucleus communication in plant immunity.** S. KIM, Department of Plant Science, Seoul National University, Seoul, Korea, Republic of (South); Plant Immunity Research Center, Seoul, Korea, Republic of (South)
- 590-P2 **A plausible role of mitochondria in epigenetic priming.** A. LOPEZ SANCHEZ, National Centre of Biotechnology, Spain
- 591-P2 **Role of BIRD-protein in growth, defense and hormonal-cross talk in *Arabidopsis thaliana*.** N. TABASSUM, KAUST, Saudi Arabia
- 592-P2 **Characterization of a novel modulator that intersects on defense and developmental adjustments in the plants.** M. KASERA, SRF, Regional Centre for Biotechnology, NCR Biotech Science Cluster, Faridabad., India
- 593-P2 **Resistance mechanisms to *Botrytis* in wild tomato.** Y. YOU, Wageningen University, Netherlands
- 594-P2 **Stylosanthes phenylalanine ammonia lyase 1 (SgPAL1) positively regulates the resistance against *Colletotrichum gloeosporioides*.** L. JIANG, Hainan University, China
- 595-P2 **Efficient CRISPR/Cas9 genome editing and tissue culture techniques for tetraploid local varieties and diploid potato.** M. LENMAN, Swedish University of Agricultural Science, Sweden
- 596-P2 **Extracellular low molecular weight phosphonates of *Pectobacterium atrosepticum*: Identification and role in pathogenesis.** O. PARFIROVA, Kazan Institute of Biochemistry and Biophysics FRC “KSC of RAS,” Russian Federation; Kazan Federal University, Russian Federation
- 597-P2 **Not the end of the story: Identifying novel players controlling intracellular rhizobial infections.** M. BATZENSCHLAGER, University of Freiburg, Faculty of Biology–Cell Biology, Germany
- 598-P2 **Phytohormone crosstalk is important for Argonaute-mediated defense against virus infection.** G. S. MARTINS, University of Sherbrooke, Canada
- 599-P2 **COLORFUL-ABA sensor reveals cell-specific activation of ABA signaling during plant-microbe interactions.** M. EL SAYED, Georg-August-University, Germany
- 600-P2 ***Thecaphora thlaspeos* infects Brassicaceae plants via novel penetration structures.** L. PLÜCKER, Heinrich-Heine University, Germany
- 601-P2 **Generation of a versatile toolbox for multicolor labelling of *Phytophthora* subhyphal compartments.** L. SHENHAV, The Sainsbury Laboratory, Cambridge University (SLCU), U.K.
- 602-P2 **Identification of three tomato proteins recruited into viral replication complexes of pepino mosaic virus.** E. MÉNDEZ-LÓPEZ, CEBAS-CSIC, Spain
- 603-P2 **Phosphatidylinositol 4-kinases contribute to defence responses triggered by actin cytoskeleton disruption in *Arabidopsis*.** T. KALACHOVA, Institute of Experimental Botany Czech Academy of Sciences, Czech Republic
- 604-P2 **Plant and human bacterial pathogens trigger similar SA-mediated defense in *Arabidopsis*.** P. R. OBLES-SUC, University of California, U.S.A.
- 605-P2 **Activation of the susceptibility factor RACB in the interaction between barley with the powdery mildew fungus.** A. TRUTZENBERG, Phytopathology, TU Munich, Germany
- 606-P2 **Growth in host plants increases *Ralstonia solanacearum* resistance to eradication treatments and environmental stresses.** M. HAYES, University of Wisconsin, Madison, U.S.A.
- 607-P2 **The role of *Phytophthora infestans* transglutaminases in appressoria formation, pathogenicity and PAMP-triggered immunity in potato.** M. BRUS-SZKALEJ, Swedish University of Agricultural Sciences, Sweden
- 608-P2 ***Arabidopsis* lipid biosynthesis genes required for successful colonization by the pathogenic oomycete *Hyaloperonospora arabidopsidis*.** C. CARDOSO, Plant Genetics, TUM School of Life Sciences, Weihenstephan, Germany
- 609-P2 **Establishing the roles and interactions of E3 ubiquitin ligase 1 (E3L1) and MAP kinase phosphatase 1 (MKP1) in pattern-triggered immunity.** J. K. ELLINGSEN, University of Missouri, U.S.A.
- 610-P2 **Characterizing mechanisms of tolerance in the *Clavibacter-Solanum* pathosystem.** C. PERITORE-GALVE, Cornell University, U.S.A.
- 613-P2 **A secreted protein from *Rhizoctonia solani* is essential for the necrotrophic interactions with rice.** S. LI, College of Plant Protection, Shenyang Agricultural University, China
- 614-P2 **Molecular mechanisms underlying the virulence of the type three secreted effector XopE35 in *Xanthomonas oryzae* pv. *oryzicola*.** S. WANG SR., China Agricultural University, China

- 615-P2 **Abscisic acid and auxin are early activated in *Arabidopsis* Atseor1ko mutants during phytoplasma infection.** C. BERNARDINI, Department of Agricultural Food Environmental and Animal Sciences, University of Udine, Italy
- 616-P2 **Monitoring changes to the plant secretory pathway during cyst nematode feeding site formation.** A. HAYES, University of Leeds, U.K.
- 618-P2 **Immune-responsive feedback between the cytoskeleton and plasma membrane.** M. J. DEEKS, University of Exeter, U.K.
- 619-P2 **Structural restriction to *Ralstonia solanacearum* colonization and invasion in resistant tomato varieties.** N. SANCHEZ COLL, Centre for Research in Agricultural Genomics, Spain
- 620-P2 **Studies on the potential role of prolyl cis/trans isomerization of signaling proteins in the regulation of *Bacillus* species social development and biocontrol activity.** M. DIMOU, Laboratory of General and Agricultural Microbiology, Agricultural University of Athens, Greece
- 621-P2 **Control of virulence by sirtuins in *Ustilago maydis*.** B. NAVARRETE, CABD Universidad Pablo de Olvide, CSIC, Junta de Andalucía, Spain
- 622-P2 **Organelle trafficking during appressorium development in *Magnaporthe oryzae*.** A. B. ESEOLA, School of Biosciences, University of Exeter, Geoffrey Pope Building, U.K.; The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 623-P2 **Pro-viral functions of the host proteins ARGONAUTE1 and VARICOSE in potato virus A infection.** K. MÄKINEN, Department of Microbiology, University of Helsinki, Finland
- 624-P2 **Studying effector secretion by the rice blast fungus *Magnaporthe oryzae*.** C. RODRIGUEZ HERRERO, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 625-P2 **Powdery mildew effectors target endoreduplication modulators in *Arabidopsis*.** A. G. MCRAE, University of California, Berkeley, U.S.A.
- 626-P2 **9-LOX derived oxylipins activate mitochondrial signaling to trigger plant defense.** C. CASTRESANA, National Centre of Biotechnology, Spain
- 627-P2 **Subcellular dynamics of red clover necrotic mosaic virus (RCNMV) double-stranded RNAs in infected plant cells.** M. KAIDO, Graduate School of Agriculture, Kyoto University, Japan
- 628-P2 **Effects of symbiotic interactions with *Gigaspora margarita* on disease resistance in tomato plants.** M. FUJITA, Fukui Prefectural University, Japan
- 629-P2 **Heat-shock treatment induces SA-dependent NPR1-independent disease resistance in *Arabidopsis*.** H. NAKASHITA, Fukui Prefectural University, Japan
- 630-P2 **How do *Ralstonia solanacearum* type III chaperones modulate the secretion of type III substrates and play essential roles in virulence?** F. VAILLEAU, LIPM, Université de Toulouse, INRA, CNRS, INPT, Castanet-Tolosan, France
- 631-P2 **Helper NLRs—How is their cell death and resistance function regulated?** S. SAILE, Center for Plant Molecular Biology (ZMBP), University of Tübingen, Germany
- 632-P2 **4 plants and a pathogen: Host-specific gene expression in *Phytophthora capsici* may underpin dynamic adaptation on diverse host crops.** M. CUMMINS, Division of Plant Sciences, The University of Dundee, U.K.
- 633-P2 **Effects of strigolactone signaling on disease resistance in *Arabidopsis*.** M. KUSAJIMA, University of Tokyo, Japan
- 634-P2 **ADR1-L2 helper NLR signals through a TIR-domain containing NLR.** P. M. JACOB, Department of Biology, University of North Carolina at Chapel Hill, U.S.A.
- 635-P2 **Signalling of membrane-localized immune receptors in *Arabidopsis*.** S. SUNIL, Center for Plant Molecular Biology (ZMBP), University of Tübingen, Germany
- 636-P2 **ERF transcription factors provide opportunities for resistance breeding towards the vascular fungal pathogen *Verticillium longisporum* by activating Indole-glucosinolate biosynthesis.** C. FRÖSCHEL, Julius-von-Sachs-Institute, Germany
- 637-P2 ***Zymoseptoria tritici* pangenome-based functional screens of candidate effector proteins in wheat.** H. CHEN, Department of Biointeractions and Crop Protection, Rothamsted Research, U.K.
- 638-P2 **Potyvirus and potexviruses small membrane binding proteins regulate bZIP60, bZIP28 and bZIP17 and programmed cell death.** M. GAYRAL, Texas A&M AgriLife Research, U.S.A.
- 639-P2 **Pattern-triggered immunity affects Rx1 mediated defence responses.** M. KNIP, University of Amsterdam, Netherlands
- 640-P2 **A jasmonate signalling network activates root stem cells and promotes regeneration.** J. L. LOZANO TORRES, Laboratory of Nematology, Wageningen University and Research, Netherlands
- 642-P2 **Chloroplasts, a major hub of immune signalling.** S. BREEN, The University of Warwick, U.K.
- 643-P2 **Getting to the root of resistance in the tomato-*Ralstonia solanacearum* pathosystem.** A. IYER-PA CUZZI, Department of Botany and Plant Pathology, Purdue University, U.S.A.
- 644-P2 ***Arabidopsis* IRE1 regulates pathogen-mediated ER stress signaling.** K. M. MUKHTAR, University of Alabama at Birmingham, U.S.A.

## POSTERS

- 645-P2 The revised cercosporin biosynthesis cluster from the sugarbeet pathogen *Cercospora beticola*. M. D. BOLTON, USDA ARS, U.S.A.
- 646-P2 Host-induced gene silencing, an unconventional strategy to enhance rust resistance in wheat. A. A. AHMED, University of California, Davis, Genome Center, U.S.A.
- 647-P2 The relationship between flower color and disease resistance against *Septoria gentianae* in Japanese gentian, possible involvement of flavonoids and related-compounds in blue pigmentation. C. TATEDA, Iwate Biotechnology Research Center, Japan
- 648-P2 Functional study of rice calcium-dependent protein kinase family. B. MU SR., China Agricultural University, China
- 649-P2 Exploring how plant nutrient transport affects resistance and susceptibility to oomycete pathogens. J. M. MCDOWELL, Virginia Tech, U.S.A.
- 651-P2 Interaction mechanisms of rice (*Oryza sativa* L.) to defense against root-knot nematode *Meloidogyne graminicola* under treatment with *Aspergillus welwitschiae*. D. PENG, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, China
- 652-P2 Genetic diversity among plant pathogenic *Streptomyces* strains from organic potato field in Korea. C. K. SHIM, Organic Agricultural Division, National Institute of Agricultural Sciences, Korea, Republic of (South)
- 653-P2 The protein interactomes of AtNHR2A and AtNHR2B unraveled common and specialized functions in plant immunity integrating distinct biological processes. C. M. ROJAS, University of Arkansas, U.S.A.
- 654-P2 Characterising powdery mildew resistance in oats. A. REILLY, University College Dublin (UCD); School of Agriculture and Food Science, UCD Earth institute, Ireland; Teagasc Crops Environment and Land Use Programme, Teagasc, Ireland
- 1001-P2 Indolic glucosinolate metabolon formation and PEN2-mediated entry control of non-adapted powdery mildews in *Arabidopsis*. L. WAGENKNECHT, Georg-August-University, Germany
- 1022-P2 Small RNAs regulate barley and powdery mildew interaction. H. PEI, Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, China

## Comparative Mutualist and Pathogen Studies

- 655-P2 Evaluating the potential of beneficial *Gaeumannomyces* species for the control of take-all disease in wheat. T. J. CHANCELLOR, Rothamsted Research, U.K.
- 656-P2 Exploring virulence factors of *Pseudomonas cannabina* pv. *alisalensis*. N. SAKATA, University of Tsukuba, Japan
- 657-P2 Acibenzolar-S-methyl activates stomatal-based defense against *Pseudomonas cannabina* pv. *alisalensis* in cabbage. T. ISHIGA, University of Tsukuba, Japan
- 658-P2 Molecular suppressive mechanism of a biocontrol agent *Rhizobium vitis* VAR03-1 against grapevine crown gall disease. Y. NOUTOSHI, Okayama University, Japan
- 659-P2 Genomics of the rose-infecting soil-borne pathogen *Rosellinia necatrix*. E. A. CHAVARRO CARRERO, Wageningen University, Netherlands
- 660-P2 Comparative secretome analysis identifies conserved motifs and protein families in the secretory proteins of plant fungal pathogens. R. JASWAL, National Agri-Food Biotechnology Institute (NABI), India
- 661-P2 Regulation of TOR pathway in context of pathogenic and symbiotic bacterial interactions with nematodes. U. RAO, ICAR-Indian Agricultural Research Institute, India
- 662-P2 Comparative studies of diverse Actinobacteria identifies new biofungicide candidates. L. F. THATCHER, CSIRO Agriculture and Food, Australia
- 663-P2 Proteomics of different immune reactions in potato leaves. M. A. ZAHID, Swedish University of Agricultural Science, Sweden
- 664-P2 Lifestyle-specific metabolic adaptations in biotrophic and necrotrophic oomycete phytopathogens involve distinct patterns of gene expression, gene content, and protein evolution. H. S. JUDELSON, University of California, U.S.A.
- 665-P2 Genome-wide translome studies reveal cell-layer specific responses of the *Arabidopsis* root towards pathogenic and mutualistic microorganisms. W. DRÖGE-LASER, Julius-von-Sachs-Institute, Germany
- 667-P2 *Oryza sativa* LysM receptor kinases regulate intracellular rice root colonisation by *Magnaporthe oryzae*. C. N. IBE, University of Cambridge, U.K.
- 668-P2 Intra-species variations in root fungus *Colletotrichum tofieldiae* cause transitions between beneficial and parasitic lifestyles. K. HIRUMA, NARA Institute of Science and Technology, Japan; JST PRESTO, Japan
- 669-P2 A satellite RNA outcompetes replicase-encoding RNAs of the helper virus for replication-associated host factors via a three way-branched RNA structure. Z. DU, Zhejiang Sci-Tech University, China
- 671-P2 Identification and characterisation of SMT, a biosynthetic gene cluster from *Epichloë* spp. involved in stroma development. B. D. SCOTT, Massey University, New Zealand

## Invertebrate- (Nematode-/Insect-) Plant Interactions

- 672-P2 The positively-selected effector MiL648 of *Meloidogyne incognita* contributes to nematode virulence through its interactions with the 12-oxophytodienoate reductase OPR2 in tomato. A. VERHOEVEN, Laboratory of Nematology, Wageningen University and Research, Netherlands
- 673-P2 Interaction of nematode-resistant plant *Solanum torvum* and virulent/avirulent root-knot nematodes. K. SATO, RIKEN Center for Sustainable Resource Science, Plant Immunity Research Group, Japan
- 674-P2 The evolutionary origins of effectors in plant-parasitic nematodes. S. EVES-VAN DEN AKKER, University of Cambridge, U.K.
- 675-P2 A nuclear localized aphid effector contributes to aphid virulence. S. LIU, University of Dundee, U.K.
- 676-P2 The role of epigenetics in the interaction between rice and parasitic nematodes. T. KYNDT, Ghent University, Belgium
- 677-P2 Long-lasting jasmonic acid induced resistance against a generalist herbivore comes at the cost of enhanced susceptibility to pathogens. S. W. WILKINSON, The University of Sheffield, U.K.
- 678-P2 Ascorbate oxidation primes the rice plants for enhanced defence against root-knot nematode *Meloidogyne graminicola* through jasmonate/ethylene activation. R. R. SINGH, Ghent University, Belgium
- 679-P2 The role of ncRNAs in the interaction between root-knot nematode and rice. B. VERSTRAETEN, Ghent University, Belgium
- 680-P2 DNA hypomethylation confers enhanced immunity against parasitic nematodes in rice. M. R. ATIGHI, Ghent University, Belgium
- 681-P2 The potato cyst nematode effector RHA1B is a ubiquitin ligase and uses two distinct mechanisms to suppress plant immune signaling. F. XIAO, University of Idaho, U.S.A.
- 682-P2 Discovery of the first pectin methylesterase gene in a plant-parasitic nematode. C. S. L. VICENTE, ICAAM–University of Evora, Portugal
- 683-P2 Investigating early aphid-induced calcium signals and their role in determining aphid-host compatibility. J. R. JOYCE, John Innes Centre, U.K.
- 684-P2 Aphid elicitors induce plant immunity in a cysteine protease-dependent manner. J. CANHAM, John Innes Centre, U.K.
- 685-P2 Understanding the role of strigolactones in cyst nematode-plant interaction. N. GUARNERI, Laboratory of Nematology, Wageningen University and Research, Netherlands
- 686-P2 Effectors of specific C13 peptidases induce host pathogenic programmed cell death—A molecular pathogenic mechanism of *Bursaphelenchus xylophilus*. B. XIE, Institute of Vegetables and Flowers, Chinese Academy of Agricultural Sciences, China
- 687-P2 Methyl esterification of pectin and oligogalacturonide signalling affect plant-aphid interactions. M. GRAVINO, John Innes Centre, U.K.
- 688-P2 An integrative outlook at protein and RNA level to understand the mechanism of resistance in a pigeonpea wild relative, *Cajanus platycarpus* to herbivory by *Helicoverpa armigera*. R. SREEVATHSA, ICAR–National Institute for Plant Biotechnology, India
- 689-P2 Evolution of effector function in an aphid chemosensory protein that suppresses plant immunity. S. T. MUGFORD, John Innes Centre, U.K.
- 690-P2 A novel aphid-specific gene family plays an important role in host colonization. Y. CHEN, John Innes Centre, U.K.
- 691-P2 Integrated decoys and aphid recognition in wheat. E. VENTER, University of Johannesburg, South Africa
- 692-P2 Towards the characterisation of a novel resistance gene to control the rice root-knot nematode. S. MANTELIN, The James Hutton Institute, U.K.
- 693-P2 Root-knot nematode effectors and their role in the tomato root interactome during infection. B. STOJILKOVIC, Faculty of Bioscience Engineering, Ghent University, Belgium
- 694-P2 Resistance-gene independent variation in susceptibility to the root-knot nematode *Meloidogyne incognita* in *Solanum lycopersicum*. M. G. STERKEN, Laboratory of Nematology, Wageningen University and Research, Netherlands
- 695-P2 Host-induced RNAi-based gene silencing (HIGS) in rice for identifying *Meloidogyne javanica* essential genes for nematode infection. D. FERNANDEZ, IRD–French Research Institute for Development, UMR IPME, IRD, Cirad, UM, France; Embrapa Genetic Resources and Biotechnology, Brazil
- 696-P2 Ethylene participate in plant defense response to whitefly *Bemisia tabaci*. C. ZOU, Zhejiang University, China
- 697-P2 Manipulation of plant defence response by a whitefly salivary protein. F. WANG, Zhejiang University, China
- 698-P2 A novel Ha18764 effector from *Heterodera avenae* suppresses plant defenses and promotes parasitism. Q. LIU, China Agricultural University, China
- 699-P2 *Heterodera avenae* GLAND5 effector interacts with pyruvate dehydrogenase subunits of plants and promotes nematode parasitism. H. JIAN, China Agricultural University, China
- 700-P2 An endosymbiont increases the retention of a plant virus in its whitefly host. T. LEI, Zhejiang University, China

## POSTERS

- 701-P2 The transcription factor TCP9 regulates responses in root architecture to the beet cyst nematode *Heterodera schachtii* in *Arabidopsis thaliana*. J. J. WILLIG, Laboratory of Nematology, Wageningen University and Research, Netherlands
- 702-P2 Functional analysis of core effectors of syncytium forming nematodes. K. LESLIE, The James Hutton Institute, University of St. Andrews, U.K.
- 704-P2 Comparing genomes of (a)virulent inbred lines of the cyst nematode *Globodera rostochiensis* regarding the potato resistance gene *H1*. J. J. M. VAN STEENBRUGGE, Laboratory of Nematology, Wageningen University and Research, Netherlands
- 705-P2 Salicylic acid biosynthesis in rice and nematode interference. H. LEFEVERE, Ghent University, Belgium
- 706-P2 Silencing of an integrated domain nucleotide-binding leucine-rich repeat (NLR-ID) gene, *Adnr1*, indicates that it underlies *Diuraphis noxia* resistance in Dn7-mediated resistance in wheat. N. S. MKHIZE, University of Johannesburg, South Africa
- 707-P2 Genome-wide association mapping of susceptibility to the root-knot nematode *Meloidogyne incognita* in *Arabidopsis thaliana*. G. SMANT, Laboratory of Nematology, Wageningen University and Research, Netherlands
- 708-P2 RanGAP1 and RanGAP2 are common virulence targets of two independently evolved effectors from the potato cyst nematode *Globodera pallida* and Potato virus X. A. GOVERSE, Laboratory of Nematology, Wageningen University and Research, Netherlands
- 710-P2 Identification, cloning and RNAi silencing of selected genes for management of pigeon pea pod borer, *Maruca vitrata*. U. RAO, ICAR–Indian Agricultural Research Institute, India
- 711-P2 The root-knot nematode effector MiEFF18 targets the host plant splicing machinery to favor parasitism. J. MEJIAS, INRA, Sophia Agrobiotech Institute, France
- 712-P2 Caught in the act: The butterfly egg-associated molecular pattern that activates plant defense. L. CAARLS, Biosystematics Group, Wageningen University and Research, Netherlands
- 713-P2 Pathogens and pests on plants: Plant attackers impact each other's performance when co-occurring on a host. L. J. A. VAN DIJK, Stockholm University, Sweden
- 714-P2 Transient expression of whitefly effectors in *Nicotiana benthamiana* leaves activates systemic immunity against the leaf pathogen *Pseudomonas syringae* and soil-borne pathogen *Ralstonia solanacearum*. C. M. RYU, University of Science and Technology, Korea, Republic of (South); KRIBB, Korea, Republic of (South)
- 715-P2 AgriVectors: A systems biology portal for plant pathosystems and arthropod vectors of plant diseases. S. SAHA, Boyce Thompson Institute, U.S.A.
- 716-P2 Uncovering the molecular basis of virulence and avirulence in the *Medicago*–pea aphid system. S. ALTMANN, University of Dundee, U.K.
- 717-P2 Comprehensive analysis of a large group of CLE effectors encoded by *Globodera* cyst nematodes. X. WANG, USDA ARS, U.S.A.; Cornell University, U.S.A.
- 718-P2 Characterisation of transthyretin-like proteins of the plant-parasitic nematode *Pratylenchus penetrans* suggests involvement in oxidative stress response. M. ESPADA, ICAAM, University of Evora, Portugal
- 719-P2 The role of root exudates in the interaction between plant parasitic nematodes and coffee plants. A. CASEY, University of Leeds, U.K.
- 720-P2 Architecture and dynamics of JA/ABA- and thrips-induced gene regulatory networks. S. C. VAN WEES, Plant-Microbe Interactions, Department of Biology, Utrecht University, Netherlands
- 721-P2 Watery saliva protein 1 (NIWSP1) of brown planthopper (*Nilaparvata lugens*) attenuates salicylic acid defense in rice. Y. JIANG, MSU-DOE Plant Research Laboratory, U.S.A.; Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, China; Howard Hughes Medical Institute, U.S.A.
- 722-P2 A putative *R* gene resistant to *Myzus persicae* is required for *Arabidopsis* defense against the green peach aphid. J. SHAH, University of North Texas, U.S.A.
- 723-P2 A genome-wide association study uncovers novel SNPs that affect the parasitic ability of *Meloidogyne graminicola* in rice. U. RAO, ICAR–Indian Agricultural Research Institute, India
- 724-P2 Softening the breaks: Releasing a key negative immune regulator results in enhanced resistance to nematodes. I. KALOSHIAN, University of California, Riverside, U.S.A.
- 725-P2 Egg-killing plants: Unravelling the genetics mechanisms of a butterfly egg-induced necrosis in *Brassica* crops. N. BASSETTI, Biosystematics Group, Wageningen University and Research, Netherlands
- 726-P2 Roles of a SNARE domain-containing protein in the interaction of soybean cyst nematode with soybean GmSNAP18. S. LIU, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, China
- 727-P2 Identification of genes involved on *Arabidopsis thaliana* response to *Meloidogyne paranaensis*. J. P. TOMAZ, IAPAR, Brazil

### Microbial Manipulation of the Host

- 728-P2 Effectors from poplar rust modulate *Arabidopsis* transcriptome. K. C. GONÇALVES DOS SANTOS, University of Quebec, Canada
- 729-P2 A novel auto-immune jasmonic acid mutant affects root hormone-defense crosstalk and associations with the microbiome. Y. SONG, The University of British Columbia, Canada

- 730-P2 **Parallel *Phytophthora* and *Pseudomonas* effector screens to identify targets of effectors in soybean.** S. B. EASTMAN, University of Nebraska, Lincoln, U.S.A.
- 731-P2 **Powdery mildew infection alters host metabolism to fuel fungal sporulation.** J. JAENISCH, University of California, Berkeley, U.S.A.
- 732-P2 **Reduction of *Phakopsora pachyrhizi* infection of soybean through host and spray induced gene silencing.** Z. Y. CHEN, Louisiana State University AgCenter, U.S.A.
- 733-P2 ***Azospirillum brasilense* is a member of the seed microbiome that forms an endophytic relationship with plant roots where it alters root development through production of auxin and cGMP.** C. E. BAUER, Indiana University, U.S.A.
- 734-P2 **Expression analysis-based selection of candidates to screen for reduced susceptibility to *Verticillium dahliae* in tomato.** K. HANIKA, Wageningen University, Netherlands
- 735-P2 **Unravelling a potential pathway linking plasma membrane to chloroplasts and its role in the regulation of plant defence responses.** L. MEDINA-PUCHE, Shanghai Center for Plant Stress Biology (PSC), China
- 736-P2 **The *Arabidopsis* receptor-like kinase IOS1 links filamentous pathogen attack to endoplasmic reticulum stress.** L. GIORDANO, INRA, UMR ISA, France
- 738-P2 **Microbial small molecules—Weapons of plant subversion.** R. DE JONGE, Plant-Microbe Interactions, Department of Biology, Utrecht University, Netherlands
- 739-P2 **The bacterial root microbiota of *Arabidopsis thaliana* influences the trade-off between plant growth and defense.** R. T. NAKANO, Max Planck Institute for Plant Breeding Research, Germany
- 740-P2 **The *Xanthomonas* type-three effector XopS interferes with proteasomal turnover of a WRKY transcription factor to dampen the induction of plant defence responses.** M. RAFFEINER, Leibniz Institute of Vegetable and Ornamental Crops, Germany
- 741-P2 **The *Verticillium dahliae* effector Ave1 manipulates the host microbiome.** N. C. SNELDERS, Wageningen University, Netherlands
- 742-P2 **Epistasis effects of AvrLm4-7 in *Leptosphaeria maculans* isolates has devastating effects on canola cultivars carrying single R-gene resistance.** D. FERNANDO, University of Manitoba, Canada
- 743-P2 **Functional analysis of the RsRlpA effector in the soil borne pathogen *Rhizoctonia solani* AG2-2IIIB revealed a potential biotrophic stage upon infection.** G. TZELEPIS, Department of Plant Biology, Swedish University of Agricultural Sciences, Sweden
- 744-P2 **PhoP of *Pectobacterium carotovorum* subsp. *brasiliense* (Pcb1692) represses T6SS and carbapenem production in planta.** N. P. NKOMO, university of Pretoria, South Africa
- 745-P2 **A novel effector FgHrip1 from *Fusarium graminearum* triggers defense response in tobacco and wheat.** H. ZENG, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, China
- 746-P2 **Comparative analysis of rice sensing of plant-beneficial *Burkholderia*.** E. KING, University of Montpellier, IRD, Cirad, IPME, Montpellier, France, France
- 747-P2 **Xylem sap proteomics reveals distinct differences between R gene- and endophyte-mediated resistance against *Fusarium* wilt disease in tomato.** F. J. DE LAMO, University of Amsterdam, Netherlands
- 748-P2 **Characterization of the effect of *Ralstonia solanacearum* NLS-containing type III effectors on plant immunity and development.** H. JEON, Seoul National University, Korea, Republic of (South)
- 749-P2 ***Phytophthora* RXLR-WY effectors cooperate to modulate host vesicle trafficking.** M. P. CONTRERAS, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 751-P2 **New effectors from the multihost blast fungus *Magnaporthe oryzae* target HMA domain containing host proteins.** Y. PETIT, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.; UMR BIOGER, INRA, AgroParisTech, Université Paris-Saclay, France
- 752-P2 **Phytoplasma effectors have converged onto degrading plant transcription factors with fundamental roles in plant development and defense to insects.** W. HUANG, John Innes Centre, U.K.
- 753-P2 **Profiling tomato global pre-mRNA splicing changes during late blight infection provides new insights into plant-microbe interaction.** J. HUANG, Nanjing Agricultural University, China
- 754-P2 **Identification of novel downy mildew proteins with diverse effects on the plant innate immune system.** K. J. WOOD, University of California, U.S.A.
- 755-P2 ***Ralstonia solanacearum* subverts plant metabolism to support bacterial nutrition and cause bacterial wilt disease.** A. P. MACHO, Shanghai Center for Plant Stress Biology, China
- 756-P2 **Integrated strategy to unravel the biological role of evolutionary conserved type III effectors from xylem-colonizing bacteria.** M. GONZALEZ-FUENTE, Université de Toulouse, LIPM, CNRS-INRA, France
- 757-P2 **Screening of small secreted proteins of *Z. tritici* reveals a candidate protein that interacts with host ubiquitin system.** S. J. KARKI, University College Dublin (UCD); School of Agriculture and Food Science, UCD Earth institute, Ireland
- 758-P2 **The two faces of an effector: Does HopAG1 exert contrasting activities?** M. GÓRECKA, Institute of Biochemistry and Biophysics PAS, Poland
- 759-P2 ***Bacillus* strains modulate immune response, biomass production and flowering time in *Arabidopsis* and *Brachypodium distachyon*.** C. JIMENEZ-QUIROS, University of Worcester, U.K.

## POSTERS

- 760-P2 **Crispr-engineered Bs4 mutants facilitate identification of TALE target genes in tomato.** K. SCHENSTNYI, ZMBP, Germany
- 761-P2 **Equilibrium in the *Pectobacterium*-Plant Pathosystem: Physiological bases and molecular players.** V. GORSHKOV, Kazan Institute of Biochemistry and Biophysics FRC “KSC of RAS,” Russian Federation; Kazan Federal University, Russian Federation
- 762-P2 **A novel susceptibility gene from tomato: Unravelling the manipulation of a transcriptional regulator by a conserved effector from *Fusarium oxysporum*.** T. R. AALDERS, Universiteit van Amsterdam, Netherlands
- 763-P2 **Autophagy: Both friend and foe in plant-bacteria interactions.** S. ÜSTÜN, Center for Plant Molecular Biology (ZMBP), Germany
- 764-P2 **Yellow rust infected field data reveals temporal differences in the expression of host primary metabolic pathways.** P. CORREDOR MORENO, John Innes Centre, U.K.
- 765-P2 **Analysis of Argonaute 1-associated small RNAs in *Phytophthora infestans* and potato.** K. PERSSON HODÉN, Department of Plant Biology, Swedish University of Agricultural Sciences, Sweden
- 766-P2 ***Pseudomonas fluorescens* LBUM677 enhances total lipid and stearidonic acid yields in corn gromwell (*Buglossoides arvensis*).** A. NOVINSČAK, Université de Moncton, Canada
- 767-P2 **Auxin plays multiple roles during *Pseudomonas syringae* pathogenesis.** B. N. KUNKEL, Washington University in St. Louis, U.S.A.
- 768-P2 **Identification of targets of the Pmk1 MAP kinase during plant colonisation by the rice blast fungus *Magnaporthe oryzae*.** N. CRUZ-MIRELES, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 769-P2 **Elucidating the localization and function of *Ustilago hordei* avirulence effector UhAVR1, during compatible and incompatible host interactions.** A. P. MONTENEGRO ALONSO, The University of British Columbia, Canada
- 770-P2 **Functional study of type III effector AvrE during plant infection.** M. YUAN, Institute of Plant Physiology and Ecology, Chinese Academy of Sciences, China
- 771-P2 **Dissecting the effect of AP2muA protein on Bamboo mosaic virus infection.** C. P. CHENG, Department of Life Sciences, Tzu Chi University, Taiwan
- 772-P2 **New insight to the role of the *Xanthomonas* core effector XopX in defense suppression and activation of cell death.** A. DUNCAN, Department of Biology, Stanford University, U.S.A.
- 773-P2 **Identification of *Pseudomonas syringae* effectors responsible for sugar efflux in *Arabidopsis* reveals a bacterial feeding strategy.** C. ROUSSIN-LÉVEILLÉE, University of Sherbrooke, Canada
- 774-P2 **Functional investigation of *Ralstonia solanacearum* PPR-containing effector in plant development and immunity.** W. KIM, Seoul National University, Korea, Republic of (South)
- 775-P2 **Nuclear effectors of *Magnaporthe oryzae* modulate host susceptibility via transcriptional reprogramming of immunity-associated target genes.** S. KIM, Department of Agricultural Biotechnology, Seoul National University, Korea, Republic of (South)
- 776-P2 **Identification and function analysis of a conserved RxLR effector from *Phytophthora parasitica*.** Q. ZHANG, College of Plant Protection, Northwest A&F University, China
- 777-P2 **The *Xanthomonas* effector protein XopI suppresses the stomatal immunity.** O. NAGEL, Martin-Luther-University, Halle-Wittenberg, Germany
- 778-P2 **Identification and functional characterisation of genes regulated by the PnPf2 Zn2Cys6 transcription factor in *Parastagonospora nodorum*.** K. C. TAN, Curtin University, Australia
- 779-P2 **Modulation of defense-related autophagy at the pathogen interface.** Y. TUMTAS, Imperial College London, U.K.
- 780-P2 **Assessing early resistance responses of sugarcane to *Xanthomonas albilineans*.** A. PERES BINI, Centro de Cana, IAC, Brazil
- 781-P2 **Towards to identification of strategies to counteract RNA silencing suppression mediated by pathogen-encoded GW/WG effectors.** G. LEPÈRE, ENS CNRS-UMR 8197, France
- 782-P2 **“The S factor” from rice in the interaction with *Rhizoctonia solani*.** J. ACEVEDO-GARCIA, European Union’s Horizon 2020 Programme, Netherlands; Keygene N.V., Netherlands
- 783-P2 **Structure/function determination of JIP60 mode of action: the ribosome inactivating protein targeted by RNase-like powdery mildew effectors.** P. D. SPANU, Imperial College London, U.K.
- 784-P2 **Functional characterization of the “negatively selected” *oafA* gene in *Pseudomonas protegens* CHA0.** H. ZHANG, Plant-Microbe Interactions, Department of Biology, Utrecht University, Netherlands
- 785-P2 **Structure and functions of extracellular polysaccharides of the phytopathogenic bacterium *Pectobacterium atrosepticum*.** B. R. ISLAMOVIĆ, Kazan Institute of Biochemistry and Biophysics FRC “KSC of RAS,” Russian Federation
- 786-P2 **Fungal manipulation of host defense during rice- and wheat-blast disease.** N. I. NAQVI, Temasek Life Sciences Laboratory, Singapore
- 787-P2 **Toward identification of TAL effector targeted susceptibility genes in black rot of cabbage caused by *Xanthomonas campestris* pv. *campestris*.** Z. DUBROW, Cornell University, U.S.A.

- 788-P2 **Early promoters of ATCV-1 show a broad cross-species activity.** A. J. P. PFITZNER, Universität Hohenheim, Germany
- 789-P2 **Equilibrium between interchangeable redox intermediates shapes plant immunity.** L. FRUNGILLO, School of Biological Sciences, University of Edinburgh, U.K.
- 790-P2 **The root invading pathogen *Fusarium oxysporum* targets PTI using cytoplasmic and apoplastic effectors.** N. TINTOR, University of Amsterdam, Netherlands
- 791-P2 **A family of *Xanthomonas* harpin peptides effective against biotic and abiotic stresses.** G. ZORNETZER, Plant Health Care, Inc., U.S.A.
- 792-P2 **Bacterial community maintenance of plant root development.** O. M. FINKEL, University of North Carolina, U.S.A.
- 793-P2 ***Aspergillus flavus* secondary metabolites and their roles in fungal development, survival and virulence.** J. W. CARY, USDA, ARS, SRRC, U.S.A.
- 794-P2 **Global novel effector-mining in the rice blast fungus *Magnaporthe oryzae*.** X. YAN, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 795-P2 **A single *Verticillium dahliae* effector induces defoliation of cotton plants.** G. L. FIORIN, Wageningen University, Netherlands
- 796-P2 **Identifying disease-critical effectors of a bacterial plant pathogen by knockout.** J. JAYARAMAN, The New Zealand Institute for Plant and Food Research Ltd., New Zealand
- 797-P2 **MiR398 plays a regulatory role in Bamboo mosaic virus infection.** N. S. LIN, Institute of Plant and Microbial Biology, Academia Sinica, Taiwan
- 798-P2 **A new putative effector Ha34609 of *Heterodera avenae* targeting to tonoplast, is involved in the formation and maintenance of syncytia.** D. PENG, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, China
- 799-P2 **The *Phytophthora sojae* effector Avh241 modulates host immunity by targeting soybean NDR1.** B. YANG, Nanjing Agricultural University, China
- 800-P2 **A *Xanthomonas* effector suppresses host immunity possibly by inhibiting dimerization of host factor.** K. YAMAGUCHI, Department of Advanced Bioscience, Kindai University, Japan
- 801-P2 **The ethylene response factor StERF49 negatively regulates potato immune response during potato virus Y infection.** A. COLL, National Institute of Biology, Slovenia
- 802-P2 **Characterization of *Pseudomonas putida* L5 and *P. fluorescence* K1-3-1, two endophytic bacteria with ability for biohardening of micropropagated strawberry seedlings.** N. C. LIN, National Taiwan University, Taiwan
- 803-P2 **An effector protein from *Ralstonia solanacearum* targets plant E3 ligases to alter secondary metabolism in plant cells and promote disease development.** J. S. RUFIAN, Shanghai Center for Plant Stress Biology, China
- 804-P2 **The *Ralstonia solanacearum* PopP2 effector exploits immune-associated MAPKs to potentiate its virulence functions and evade host recognition.** L. DESLANDES, Université de Toulouse, LIPM, CNRS-INRA, France
- 805-P2 ***Sarocladium oryzae* and *Pseudomonas fuscovaginae*, two very different pathogens causing rice sheath rot in a surprisingly similar way.** K. J. PEETERS, Ghent University, Belgium
- 806-P2 **Specificity of proteasome regulation by tail-anchored transcription factors during plant immunity.** G. LANGIN, Center for Plant Molecular Biology (ZMBP), Germany
- 807-P2 ***Pseudomonas syringae* produces an inhibitor of a plant defence-related Beta-galactosidase.** N. SANGUANKIATTICHAI, University of Oxford, U.K.
- 808-P2 **Bioinformatics and transcriptomic analysis of the HrpL regulon in *Pseudomonas savastanoi* pathovars of woody host.** A. MORENO PEREZ, IHSM-UMA-CSIC, Spain
- 809-P2 **Natural variation of HopQ1 effector from *Pseudomonas syringae*.** P. B. ZEMBEK, Institute of Biochemistry and Biophysics, PAS, Poland
- 811-P2 **Cytokinin level manipulation in the ergot fungus *Claviceps purpurea*.** S. KIND, RWTH Aachen University, Plant Physiology Department, Germany; University of Münster, Germany
- 812-P2 **Investigating the barley proteome of powdery mildew haustorial complexes to identify host susceptibility factors promoting *Blumeria* infection.** S. LAMBERTUCCI, Royal Holloway University of London, U.K.
- 813-P2 **A structural perspective on the diversification and adaptation of oomycete and fungal plant pathogen effector proteins.** R. K. HUGHES, John Innes Centre, Norwich Research Park, U.K.
- 814-P2 **Functional characterization of a regulator for leaf tumor formation in *Ustilago maydis*.** J. S. LIN, Max Planck Institute for Terrestrial Microbiology, Germany
- 815-P2 **Regulation of bacterial pathogenesis of plants by two component systems.** A. PANDEY, CSIR–Central Institute of Medicinal and Aromatic Plants, India
- 816-P2 **Functional characterization of the conserved effector AvrHar in *Pyrenophora teres* f. *teres*.** N. A. WYATT, North Dakota State University, U.S.A.
- 818-P2 **Association mapping to identify *Sclerotinia sclerotiorum* genes influencing aggressiveness on sunflower.** W. UNDERWOOD, Sunflower and Plant Biology Research Unit, USDA ARS, U.S.A.

## POSTERS

- 819-P2 Reference genes for transcript profiling in *Uromyces appendiculatus* during urediospore infection of common bean. T. I. LINK, University of Hohenheim, Germany
- 820-P2 Host-interactor screens of RXLR effectors reveal plant processes manipulated by *Phytophthora*. J. WIN, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 821-P2 Function and regulation of *Verticillium longisporum*-encoded putative effector genes. L. SCHÄFER, Georg-August-University, Göttingen, Germany
- 822-P2 Crystal structure of rice blast effector AVR-Pii in complex with host Exo70 defines a new effector-target interface and a novel fold for fungal effectors. J. C. DE LA CONCEPCION, John Innes Centre, Norwich Research Park, U.K.
- 823-P2 Is the pH responsive transcription factor PacC required for the virulence of wheat pathogenic fungi and the regulation of effector expression in *Blumeria graminis*? S. DAS GUPTA, Royal Holloway University of London, U.K.
- 824-P2 Coffee rust effectors subvert innate immunity and localize in the plant nucleus and chloroplasts. S. H. BROMMONSCHENKEL, Universidade Federal de Viçosa, Brazil
- 825-P2 Next-generation interaction screening for discovery of host targets of fungal effectors. R. WISE, USDA-ARS, Iowa State University, U.S.A.
- 826-P2 Abscisic acid-mediated signaling is a nexus of host modulation by the *A. tumefaciens* type VI secretion system. L. M. BANTA, Williams College, U.S.A.
- 827-P2 *Phytophthora* suppressor of RNA silencing 2 (PSR2) targets secondary small interfering RNA accumulation by interacting with double-stranded RNA binding protein 4 (DRB4) in *Arabidopsis*. Y. ZHAI, University of California, U.S.A.
- 828-P2 'Ca. *Liberibacter asiaticus*' peroxiredoxin (LasBCP) is a secreted effector that suppresses ROS-mediated localized and systemic defense responses in citrus. D. W. GABRIEL, University of Florida, U.S.A.
- 829-P2 HopG1 targets the *Arabidopsis thaliana* nonhost resistance 2B (AtNHR2B) to interfere with plant immune responses upon bacterial infection. C. M. RODRIGUEZ-PUERTO, University of Arkansas, U.S.A.
- 830-P2 Uncovering soybean rust effectors and their interactions within the host. S. A. WHITHAM, Iowa State University, U.S.A.
- 831-P2 A novel SPRYSEC effector RBP-2 from soybean cyst nematode *Heterodera glycines* suppresses plant immunity to promote parasitism. H. PENG, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, China
- 832-P2 Mapping of the key events in the development of the tomato hairy root disease. E. CEULEMANS, VIB Center for Plant Systems Biology, Belgium
- 833-P2 The pathogen-host interactions phenotype database, PHI-base: Harnessing community expertise to fight plant diseases. K. HAMMOND-KOSACK, Rothamsted Research, U.K.
- 834-P2 Differentially expressed genes and metabolomic regulation induced by salt and *Epichloë endophyte* in *Festuca rubra* subsp. *pruinosa*. E. PEREIRA, Institute of Natural Resources and Agrobiological of Salamanca (IRNASA-CSIC), Spain
- 835-P2 Hijacking ABA biosynthesis pathway for virulence in wheat by *Xanthomonas*. F. F. WHITE, University of Florida, U.S.A.
- 836-P2 Study of the functional domains of the PTGS suppressor V2 from geminivirus Beet curly top virus (BCTV). A. P. LUNA, IHSM-UMA-CSIC, Spain
- 1012-P2 An RxLR effector from *Phytophthora infestans* interacts with a lipid binding protein to regulate plant susceptibility. H. ZHAO, State Key Laboratory of Crop Stress Biology for Arid Areas, Northwest A & F University, China; Division of Plant Science, James Hutton Institute, University of Dundee, U.K.
- 1016-P2 RNA 2 of Cucumber mosaic virus mediates aphid deterrence in tomato. W. ARINAITWE, University of Cambridge, U.K.
- 1017-P2 Functional study of *Ralstonia solanacearum* effector PopP3. C. P. CHENG, National Taiwan University, Taiwan

## Population Biology, Ecology, and Genomics

- 838-P2 A genome-wide screen identifies *Pseudomonas syringae* B728a genes required for epiphytic and apoplastic leaf colonization. T. C. HELMANN, University of California, U.S.A.
- 839-P2 Prevalence of co-infection of wheat by *Pyrenophora tritici-repentis* and *Parastagonospora nodorum* in the wheatbelt of western Australia. A. A. SOLMAN, Curtin University, Australia
- 840-P2 Mapping and pyramiding adult plant resistance loci to manage oat crown rust caused by *Puccinia coronata* f. sp. *avenae*. E. S. NAZARENO, University of Minnesota, U.S.A.
- 841-P2 Effector distribution in *Xanthomonas* species that cause bacterial leaf spot of tomato, capsicum and chilli in Australia. C. F. GAMBEY, Horticulture and Forestry Science, Department of Agriculture and Fisheries, Queensland, Australia
- 843-P2 Genomic characterization and effector identification in 'Candidatus *Phytoplasma cynodontis*', the causative agent of Bermudagrass white leaf (BGWL) disease. C. H. KUO, Academia Sinica, Taiwan

- 844-P2 **A novel gene cluster involved in high tolerance to copper compounds has been detected in *Pseudomonas syringae* pv. *syringae*.** J. A. GUTIÉRREZ-BARRANQUERO, Department of Microbiology, Faculty of Science, University of Malaga, Spain
- 845-P2 **Mapping of a major quantitative trait locus for bakanae disease resistance in rice.** H. JI, National Institute of Agricultural Sciences, Korea, Republic of (South)
- 846-P2 **A new role of retrotransposons in fungal virulence.** A. WEIBERG, Ludwig-Maximilians University (LMU), Germany
- 847-P2 **Gene erosion and genome expansion in a group of highly host-specialized fungal phytopathogens.** R. PANSTRUGA, RWTH Aachen University, Germany
- 848-P2 **Genotypic and functional characterization of *Streptomyces* spp. causing potato common scab in eastern Canada.** C. HUDEC, Université de Moncton, Canada
- 849-P2 **Whole-genome analyses reveals novel pathogenic features of the necrotrophic pathogen–*Alternaria brassicae*.** S. RAJARAMMOHAN, National Agri-Food Biotechnology Institute, India
- 851-P2 **The compound 2-hexyl, 5-propyl resorcinol has a key role in biofilm formation by the biocontrol rhizobacterium *Pseudomonas chlororaphis* PCL1606.** S. TIENDA SERRANO, Department of Microbiology, Faculty of Science, University of Malaga, Spain
- 852-P2 **Adaptation to plant communities across the genome of *Arabidopsis thaliana*.** B. MAYJONADE, IN-RA-LIPM, France
- 853-P2 **Investigating the molecular interactions of *Plasmiodiophora brassicae* with *Arabidopsis thaliana* through a genome-wide association study and gene expression analysis.** J. C. OCHOA, Institute of Plant Genetics, Polish Academy of Science, Poland
- 854-P2 **A Psl-like polysaccharide has a key role in the biofilm architecture of two plant-associated *Pseudomonas*.** Z. HEREDIA-PONCE, Department of Microbiology, Faculty of Science, University of Malaga, Spain
- 855-P2 **New insights into pathogenicity of the emerging tropical pathogen: *Phytophthora colocasiae* on taro.** D. SEN, Swedish University of Agricultural Sciences, Sweden
- 856-P2 **Chromosome scale comparative analysis of two wheat cultivars unravels large structural variations and underpinning molecular mechanisms.** A. K. THIND, The Sainsbury Laboratory, U.K.; University of Zurich, Switzerland
- 857-P2 ***Bremia lactucae* exhibits genomic signatures of somatic hybrid vigor due to heterokaryosis with phenotypic consequences.** K. FLETCHER, University of California, U.S.A.
- 858-P2 **Biosynthesis of IAA in *Pseudomonas savastanoi*: A comparative genomic approach.** A. PINTADO, IHSM-UMA-CSIC, Spain
- 859-P2 **Genomic analysis of the Solanaceae NLRome.** E. SEO, University of California, U.S.A.
- 860-P2 **RIP mutations an important driver of genome variation in *Fusarium circinatum*.** S. VAN WYK, University of Pretoria, Forestry and Agricultural Biotechnology Institute, South Africa
- 861-P2 **Updated analysis of *Plasmiodiophora brassicae* genomes—MPMI 2019.** S. STJELJA, Swedish University of Agricultural Sciences, Department of Plant Biology, Sweden
- 862-P2 **Rapid diagnostic method to identify bacteria associated with acute oak decline.** V. BUENO-GONZALEZ, University of the West of England, U.K.
- 863-P2 **Multiple quantitative trait loci contribute tolerance to bacterial canker incited by *Pseudomonas syringae* pv. *actinidiae* in diploid kiwifruit (*Actinidia chinensis*).** J. TAHIR, The New Zealand Institute of Plant and Food Research, New Zealand
- 865-P2 **Distinct life histories impact dikaryotic genome evolution in the wheat stripe rust fungus *Puccinia striiformis* f. sp. *tritici*.** B. SCHWESSINGER, Research School of Biology, The Australian National University, Australia
- 867-P2 **Identification and comparative analyses of *NBS-LRR* genes in multiple melon reference genomes.** A. Y. SHIN, Korea Research Institute of Bioscience and Biotechnology, Korea, Republic of (South)
- 868-P2 **Characterization and pathogenicity of new morphospecies from apple bitter rot disease (*Colletotrichum* spp.) in Korea.** M. M. OO, Department of Applied Biology, Chungnam National University, Korea, Republic of (South)
- 869-P2 **Comparative analyses of compatible and incompatible host-pathogen interactions provide insight into host specialization of closely related pathogens.** J. HAUEISEN, Environmental Genomics, Botanical Institute, University of Kiel, Germany; Max Planck Institute for Evolutionary Biology, Germany
- 870-P2 **Pangenome analysis of the wheat pathogen *Zymoseptoria tritici* from the U.K.** E. CURRAN, University College Dublin; School of Agriculture and Food Science, Ireland
- 871-P2 **Dissecting the key effectors involved in *Pseudomonas* cherry canker.** M. T. HULIN, NIAB EMR, U.K.
- 872-P2 **Using population level diversity of the rice blast fungus *Magnaporthe oryzae* to identify new resistant varieties of rice for Sub-Saharan Africa.** V. M. WERE, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 874-P2 **Targeted nanopore sequencing for real-time plant disease diagnostics and strain-level identification of fungal pathogens.** G. V. RADHAKRISHNAN, John Innes Centre, U.K.

## POSTERS

- 875-P2 Investigating the genetic diversity of the fungal wheat pathogens *Zymoseptoria tritici* and *Fusarium graminearum* from field site isolates. P. PILO, UCD; School of Agriculture and Food Science, UCD Earth institute, Ireland
- 876-P2 Exploring NLR diversity in *Oryza sativa*. S. FAIRHEAD, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 877-P2 Genetic analysis of immune responses in *Brassica* species. H. J. SCHOONBEEK, John Innes Centre, U.K.
- 878-P2 The dark matter of genomics: Mini-chromosomes as drivers of host adaptation in the blast fungus. T. LANGNER, The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 879-P2 The genetics of plant-plant cooperation in *Arabidopsis thaliana*. H. J. SUBRAHMANIAM, INRA, France
- 881-P2 Genomic diversity and insights into virulence of the Huanglongbing pathogen 'Candidatus Liberibacter asiaticus'. S. P. THAPA, University of California, U.S.A.
- 882-P2 Characterizing the growth and gene expression profile of *Phytophthora agathidicida* in (the soils of) alternate land managements. P. PANDA, Scion, New Zealand Forest Research Institute Limited, New Zealand
- 883-P2 New Insights into mycoparasitism and microbial defence in oomycete-oomycete interactions revealed through comparative genomics and microbiome sequencing. L. J. GRENVILLE-BRIGGS, Swedish University of Agricultural Sciences, Sweden
- 884-P2 Genomics of *Phytophthora* forest pathogens provides fundamental knowledge for advancing disease management. R. L. MCDUGAL, Scion (New Zealand Forest Research Institute, Ltd.), New Zealand
- 885-P2 TAL effector composition and characterization of *Xanthomonas citri* pv. *mangiferaeindicae*. M. R. DOMMEL, University of Florida, U.S.A.
- 886-P2 Effector profile analysis of the tomato and pepper pathogens *Xanthomonas perforans* and *X. euvesicatoria*. F. IRUEGAS-BOCARD, Department of Plant Pathology, University of Florida, U.S.A.
- 887-P2 The evolution of *Arabidopsis thaliana*-associated *Pseudomonas*. H. ASHKENAZY, Max Planck Institute for Developmental Biology, Germany
- 888-P2 Genome-wide study identifies epistatic interactions between immune genes in *Arabidopsis*. W. ZHU, Max Planck Institute for Developmental Biology, Germany
- 889-P2 Molecular evolutionary characterizations of antagonistic *Fusarium* species identified from the soybean rhizosphere soil. L. KONG, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, China
- 890-P2 Re-programming of *Pseudomonas syringae* pv. *actinidiae* gene expression during early stages of infection of kiwifruit. M. D. TEMPLETON, The New Zealand Institute for Plant and Food Research Ltd., New Zealand; University of Auckland, New Zealand; Bioprotection Centre for Research Excellence, New Zealand
- 891-P2 Molecular characterization of brown rot pathogen, *Ralstonia solanacearum* of Bangladesh. M. I. HOSSAIN, Department of Plant Pathology, Bangladesh Agricultural University, Bangladesh
- 892-P2 Metabarcoding diagnostics of *Phytophthora* species in environmental samples. L. PRITCHARD, The James Hutton Institute, U.K.
- 893-P2 Assessing the genetic diversity of *Cercospora* species associated with Cercospora leaf blight of soybean in North America. K. B. SWIFT, University of Arkansas, U.S.A.
- 894-P2 Co-infection shapes pathogen fitness in a genetically diverse population of *Pseudomonas viridiflava* isolates from *Arabidopsis*. A. D. GLOSS, University of Chicago, U.S.A.
- 1003-P2 Re-shaping of effector repertoires in different pathotypes of *Magnaporthe oryzae*. K. T. KIM, Department of Agricultural Biotechnology, Seoul National University, Korea, Republic of (South)
- 1023-P2 Population genetics of *Hyaloperonospora arabidopsidis* (*Hpa*), a natural oomycete pathogen of *Arabidopsis thaliana*. F. PAUL, Max Planck Institute for Developmental Biology, Germany
- 1024-P2 Fungicide sensitivity for a diverse set of *Fusarium* species causing the FHB complex of wheat. M. JENNIFER, Syngenta Crop Protection AG, U.S.A.

## Symbiosis and Mutualism

- 895-P2 Gibberellin promotes fungal entry and colonization during *Paris*-type arbuscular mycorrhizal symbiosis in *Eustoma grandiflorum*. T. TOMINAGA, Tottori University, Japan
- 896-P2 The metabolic root of beneficial rhizobacteria-induced systemic resistance. I. A. STRINGLIS, Plant-Microbe Interactions, Department of Biology, Utrecht University, Netherlands
- 897-P2 Novel insights to arbuscular mycorrhizal pre-symbiotic signalling—A transcriptomic approach to characterize fungal-triggered responses in rice. W. SUMMERS, University of Cambridge, U.K.
- 898-P2 A broadly applicable and integrated biological strategy to induce ammonia excretion from symbiotic diazotrophs for plant fertilization. T. SCHNABEL, Stanford University, U.S.A.
- 899-P2 The origin of new gene families and the convergence of molecular interactions during a niche transition in ectomycorrhizal *Amanita*. Y. W. WANG, University of Wisconsin, Madison, U.S.A.
- 900-P2 Raman spectroscopy as a tool to study genotype-species dependence of tomato-*Trichoderma* interaction effects on seed germination. D. PANKOVIC, Educons University, Serbia
- 901-P2 Adaptations and evolution of a heritable leaf nodule symbiosis between *Dioscorea sansibarensis* and *Orrella dioscoreae*. A. CARLIER, Ghent University, Belgium

- 902-P2 **A legume actin depolymerization factor is required for rhizobia infection and nodule organogenesis.** C. QUINTO, Departamento de Biología Molecular de Plantas, Instituto de Biotecnología, UNAM, Mexico
- 903-P2 **Transcriptome analysis of the antagonistic effect of NADPH oxidase gene *RbohB* in the common bean after rhizobial and arbuscular mycorrhizal inoculation.** C. FONSECA, Departamento de Biología Molecular de Plantas, Instituto de Biotecnología, UNAM, Mexico
- 904-P2 ***Fusarium oxysporum* endophytes and pathogens featuring as Dr. Jekyll and Mr. Hyde.** M. E. CONSTANTIN, University of Amsterdam, Netherlands
- 905-P2 **Genetic tools in *Frankia*: Yes we can, from complementation to site-specific mutagenesis.** C. PESCE, University of New Hampshire, U.S.A.
- 906-P2 **Symbiosis-induced rice phosphate transporter PT13 mediates cellular phosphate efflux.** S. Y. YANG, National Taiwan University, Institute of Plant Biology, Taiwan
- 907-P2 **Characterization of North American strains of the fungal endophyte PRB110.** S. DÍAZ GONZÁLEZ, Plant Response Biotech, S.L./Universidad Politécnica de Madrid, Spain
- 908-P2 **Modulation of quorum sensing as an adaptation to nodule cell infection during experimental evolution of legume symbionts.** M. TANG, LIPM, Université de Toulouse, INRA, CNRS, France
- 909-P2 **Reexamining the phenomenon of chemotaxis to host exuded flavonoids in *S. meliloti*.** K. K. COMPTON III, Virginia Tech, U.S.A.
- 910-P2 **The genomic bases for cheating among wild populations of nodule-associated *Bradyrhizobium*.** A. J. WEISBERG, Oregon State University, U.S.A.
- 911-P2 **Comparative genomic analysis reveals the convergent evolution of lichen-forming fungi.** H. SONG, Interdisciplinary Program in Agricultural Genomics, Seoul National University, Korea, Republic of (South)
- 912-P2 **Physiological and molecular mechanisms of enhanced rice root development inoculated with *Burkholderia vietnamiensis*.** R. SHINJO, Nagoya University, Japan
- 913-P2 **Fungal endophytes mediate plant drought tolerance through alteration of host metabolism, enzymatic activities and gene expression.** K. M. G. DASTOGEER, Bangladesh Agricultural University, Bangladesh; Murdoch University, Australia
- 914-P2 **A comparative transcriptome analysis reveals rhizobial infection-related pathways dependent on ERN AP2/ERF transcription factors.** J. FOURNIER, Laboratory of Plant Microbe Interactions (LIPM), INRA, CNRS, University of Toulouse, France
- 915-P2 **How does the addition of isoflavones into the culture medium during bradyrhizobia growth impacts soybean-bradyrhizobia symbiosis?** M. A. MOREL REVETRIA, IIBCE, Uruguay
- 916-P2 **Impact of *Arabidopsis* micronutrient status and root-associated bacterial communities on accommodation of host-beneficial fungal endophytes.** A. S. PIRO, Max Planck Institute for Plant Breeding Research, Germany
- 917-P2 **A novel DNA-binding transcriptional regulator participates in the activation of RAM1 during arbuscule development.** M. PARIÉS, Technical University of Munich (TUM)–Plant Genetics, Germany; Ludwig-Maximilians-University (LMU), Munich, Germany
- 918-P2 **noeM, a novel nodulation gene involved in symbiosis with *Mimosa pudica*.** B. DAUBECH, INRA-LIPM, France
- 919-P2 **Small regulatory RNAs and epigenetic control of arbuscular mycorrhizal symbiosis.** A. DALLAIRE, The Gurdon Institute, University of Cambridge, U.K.
- 920-P2 **Relationships between arbuscular mycorrhizal fungi association, low phosphate tolerance and root architecture in strawberry.** H. M. COCKERTON, NIAB EMR, U.K.
- 921-P2 **Thinking outside the plant: TAL effector-like proteins in a bacterial-fungal symbiosis.** M. E. CARTER, Cornell University, U.S.A.
- 922-P2 **Rice plants expressing the *Rhizophagus irregularis* RiPEIP1 gene show enhanced growth and increased level of mycorrhizal colonization.** C. VOTTA, University of Torino, Italy
- 923-P2 **Enhancement of ginsenoside production in ginseng by the treatment of formulated endophyte isolated from mountain-cultivated ginseng (*Panax ginseng* Meyer).** H. BAE, Yeungnam University, Korea, Republic of (South)
- 924-P2 **Characterization of a cis-regulatory region in NIN promoter required for infection thread formation in *Lotus japonicus*.** A. AKAMATSU, Kwansei Gakuin University, Japan
- 925-P2 **Deciphering the cellular and molecular bases of rhizobial pre-infection reprogramming in *Medicago truncatula*.** F. DE CARVALHO-NIEBEL, Laboratory of Plant Microbe Interactions (LIPM), INRA, CNRS, University of Toulouse, France
- 926-P2 **A mutation in the E3-ubiquitin ligase PUB1 alters Nod factor structure recognition by *Medicago truncatula*.** M. D. MBENGUE, Laboratoire des Interactions Plantes Microorganismes, INRA-CNRS, France
- 927-P2 **Optimising growth promotion and induced resistance in cucumber exposed to gaseous bacterial volatiles in a miniature greenhouse system.** M. RIU, KRIBB, Korea, Republic of (South); Chungnam National University, Korea, Republic of (South)
- 928-P2 **Evolution of a recently emerged heritable plant symbiont.** B. DANNEELS, University of Ghent, Belgium

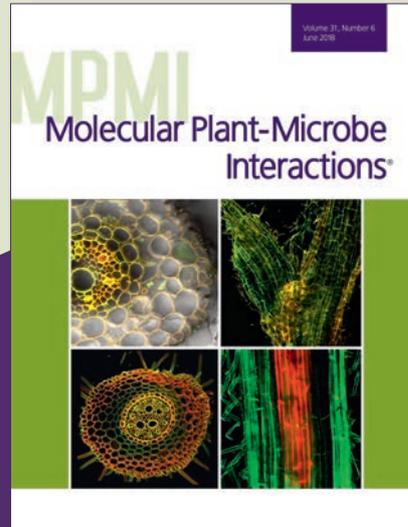
## POSTERS

- 929-P2 **Influence of the mutual symbiotic fungi *Epichloë* spp. on the grass host phyllosphere microbial community.** Y. BECKER, Julius Kühn-Institut, Institute for Epidemiology and Pathogen Diagnostics, Germany
- 931-P **Stereoisomers of the bacterial volatile compound 2,3-butanediol differently elicit systemic defense responses of pepper against multiple viruses in the field.** C. M. RYU, University of Science and Technology, Korea, Republic of (South); KRIBB, Korea, Republic of (South)
- 932-P2 **Periarbuscular membrane signalling in plant host promoting arbuscular mycorrhizal fungal fitness.** H. MONTERO, University of Cambridge, U.K.
- 933-P2 **Detection and analysis of bidirectional cross-kingdom communication in a plant-endosymbiont system.** E. SECIC, Institute of Phytopathology, Justus-Liebig-Universität, Germany
- 934-P2 **Identifying the genetic determinants of barley colonisation by the growth-promoting biocontrol agent *Pseudomonas fluorescens*.** A. PACHECO-MORENO, John Innes Centre, Norwich Research Park, U.K.; University of East Anglia, U.K.
- 936-P2 **Recognition of chito-octamers and lipochito-oligosaccharides activate symbiosis signaling in plants.** J. SUN, The Sainsbury Laboratory, Cambridge University, U.K.
- 937-P2 **Immune-suppressing pattern recognition receptors mediate host-driven recruitment of microbes.** W. MUCHERO, Oak Ridge National Laboratory, U.S.A.
- 938-P2 **Transcriptomic comparison of *Medicago truncatula* during symbiosis.** T. LEE, The Sainsbury Laboratory, Cambridge University, U.K.
- 939-P2 **Use of blumenols as reliable shoot markers of arbuscular mycorrhizal colonisation in rice.** E. K. SERVANTE, University of Cambridge, U.K.
- 940-P2 **Genotype-species dependence of tomato-*Trichoderma* interaction effects on plant sprouting and growth.** I. VUKELIC, Educons University, Serbia
- 941-P2 **Comparative analysis of *Medicago truncatula* mutants deficient in NCR peptides essential for symbiotic nitrogen fixation.** P. KALO, Biological Research Center, Hungary
- 942-P2 **Transcriptional profiling of arbuscular mycorrhiza symbiosis in the liverwort *Marchantia paleacea*.** M. SGROI, University of Cambridge, U.K.
- 943-P2 **Spatiotemporal dynamics of nutrient exchange at the arbuscule.** J. MCGALEY, University of Cambridge, U.K.
- 944-P2 **Nodule inception recruits the lateral root developmental program for symbiotic nodule organogenesis.** K. SCHIESSL, SLCU, U.K.
- 945-P2 **Unraveling root-type specific phosphate uptake in rice plants under arbuscular mycorrhizal conditions.** D. ALBINSKY, University of Cambridge, U.K.
- 946-P2 **Zaxinone, a natural apocarotenoid, is involved in the establishment of the arbuscular mycorrhizal symbiosis.** V. FIORILLI, University of Torino, Italy
- 947-P2 **NSP1 and NSP2 regulate a large group of genes associated with strigolactone biosynthesis of a symbiotic state.** X. LI, The Sainsbury Laboratory, University of Cambridge, U.K.
- 948-P2 **Processing of nodule inception is essential for legume-rhizobial symbiosis.** J. FENG, The Sainsbury Laboratory, University of Cambridge, U.K.
- 949-P2 **The impacts of *Delftia* sp. JD2 in the symbiosis among bradyrhizobia and soybean.** M. A. MOREL REVERTIA, IIBCE, Uruguay
- 950-P2 **Multi-level control of *Pseudomonas fluorescens* rhizosphere adaptation.** J. G. MALONE, John Innes Centre, Norwich Research Park, U.K.; University of East Anglia, U.K.
- 951-P2 **Reprogramming of GIPC glycosylation by GINT1 is critical for the persistence of perimicrobial membranes in *Medicago truncatula*.** W. MOORE, Joint BioEnergy Institute, U.S.A.
- 952-P2 **Characterization of nitrogen uptake and transfer in plant-arbuscular mycorrhizae symbioses.** S. L. ROWE, Michigan State University, U.S.A.
- 953-P2 **Is auxin signaling part of the RAM1-regulated arbuscocyte developmental program?** F. DU, Plant Genetics, TUM School of Life Sciences Weihenstephan, Freising, Germany
- 954-P2 **Phosphoproteomics reveals the downstream phosphorylation signaling targets of the lectin receptor-like kinase PtLecRLK1 involved in plant/mycorrhizal symbiosis.** R. L. HETTICH, Oak Ridge National Laboratory, U.S.A.
- 955-P2 ***Bradyrhizobium* sp. LVM 105 forms nitrogen-fixing nodules with *Glycine soja*, but is impaired in its ability to form nodules with agronomically improved soybean cultivars.** H. B. KRISHNAN, USDA ARS, U.S.A.
- 956-P2 **Genetic and molecular mechanisms underlying symbiosis specificity in legumes.** H. ZHU, University of Kentucky, U.S.A.
- 957-P2 **Rapid phosphorylation of soybean RIN4 upon rhizobial treatment.** K. TOTH, University of Missouri, U.S.A.
- 958-P2 **Role of metabolic genes during the infection process in *Rhizobium*-legume symbiosis.** R. LEDERMANN, University of Oxford, U.K.
- 959-P2 **Activation of the general stress response by stress-specific sensor histidine kinases is crucial for host infection by *Bradyrhizobium diazoefficiens*.** J. WÜLSER, ETH Zurich, Switzerland
- 960-P2 **The role of lipid signaling in the recruitment and activation of the Nox complex in the fungal endophyte *Epichloë festucae*.** B. D. SCOTT, Massey University, New Zealand

## Systems Biology and Modelling Plant-Microbe Interactions

- 961-P2 Improved network biology approach discovers high-confidence candidate host targets of pathogen TAL effector target genes in bacterial leaf streak of rice. B. MISHRA, University of Alabama at Birmingham, U.S.A.
- 962-P2 Long-lasting priming by  $\beta$ -aminobutyric acid is marked by de novo DNA hypomethylation. M. R. ROBERTS, Lancaster University, U.K.
- 963-P2 Dual dissection of the molecular dialogue driving the bread wheat—*Fusarium graminearum* interaction reveals the co-regulation of candidate susceptibility factors and fungal effectors. L. BONHOMME, UMR GDEC INRA/UCA, France
- 965-P2 Multiple regulatory hubs are involved in the RKS1-dependent gene network controlling quantitative disease resistance against *Xanthomonas campestris*. F. DELPLACE, LIPM, INRA, CNRS, Université de Toulouse, France
- 966-P2 Modeling effector-host interactions in the context of the barley protein interactome. V. VELASQUEZ-ZAPATA, Iowa State University, U.S.A.
- 968-P2 The transcriptional landscape of plant pattern-triggered immunity. M. BJORNSON, Institute of Plant and Microbial Biology and Zürich-Basel Plant Science Center, UZH, Switzerland; The Sainsbury Laboratory, University of East Anglia, Norwich Research Park, U.K.
- 969-P2 Spatiotemporal analysis of potato hypersensitive response-conferred resistance to Potato virus Y: RBOHD is required for successful virus arrest. K. GRUDEN, National Institute of Biology, Slovenia
- 970-P2 Molecular cloning and characterization of *Capsicum* spp. *NBS-LRR* gene related to anthracnose resistance. S. PARK, National Institute of Agricultural Sciences, Korea, Republic of (South)
- 971-P2 Metabolic niches in the rhizosphere microbiome investigated using exometabolomics. R. P. JACOBY, University of Cologne, Botanical Institute and CEPLAS, Germany
- 972-P2 Identification of new plant virus 3'-cap-independent translational enhancers. V. TRUNIGER, CEBAS-CSIC, Spain
- 973-P2 Exploring the landscape of existing motifs in networks of *Arabidopsis thaliana* and *Solanum tuberosum* under biotic stress. Ž. RAMŠAK, National Institute of Biology, Slovenia
- 974-P2 Metabolomics of triggered defences in the *Sorghum bicolor*–*Burkholderia andropogonis* Interaction. I. A. DUBERY, University of Johannesburg, South Africa
- 975-P2 Enhanced late blight resistance of potato shown by siRNA mediated control of pathogen gene expression in greenhouse and field trials. D. J. STAHL, KWS SAAT SE, Germany
- 976-P2 EvoMPMI: Genetic signatures for phenylpropanoid biosynthesis in streptophyte algae. J. DE VRIES, Dalhousie University, Canada; Technische Universität Braunschweig, Germany
- 977-P2 Elucidating the transcriptional networks underlying the salicylic acid response in *Arabidopsis*. R. HICKMAN, Plant-Microbe Interactions, Department of Biology, Utrecht University, Netherlands
- 978-P2 Capsid dynamics of tripartite brome mosaic virus assembled independently in vivo. A. RAO, University of California, U.S.A.
- 979-P2 A genetic screen for important elements in bacterial pathogenesis. J. WU, Institute of Plant Physiology and Ecology, Chinese Academy of Sciences, China
- 980-P2 The effector-triggered immunity landscape of a host-pathogen interaction and its implications for broad-spectrum disease resistance. B. LAFLAMME, University of Toronto, Canada
- 981-P2 Elucidating defense networks in potato toward *Alternaria solani* and *Phytophthora infestans*. C. MILLION, Swedish University of Agricultural Sciences (SLU), Sweden
- 982-P2 High resolution transcriptomics reveals the significance of cell identity in directing cell type-specific immunity networks. P. SCHÄFER, University of Warwick, U.K.
- 983-P2 Systems biology approaches to understanding a plant's adaptation to and regulation of the phytobiome. D. JACOBSON, Oak Ridge National Laboratory, U.S.A.
- 984-P2 Using X-ray computed tomography to phenotype the fungal pathogen *Zymoseptoria tritici*. C. LAWLESS, University College Dublin (UCD); School of Agriculture and Food Science, UCD Earth institute, Ireland
- 985-P2 Phytohormone network-mapping reveals a function for TOPLESS in salicylic acid-mediated defense signaling. P. A. RODRIGUEZ, Helmholtz Zentrum München, Germany
- 986-P2 Temporal regulation of maize genes expression during sugarcane mosaic virus infection. T. ZHOU, Department of Plant Pathology, China Agricultural University, China
- 987-P2 Transcriptomic analysis unveils gene networks associated with the *Fusarium* head blight resistance transferred from *Triticum turgidum* ssp. *carthlicum* into durum wheat. E. SARI, Aquatic and Crop Resource Development, National Research Council Canada, Canada
- 988-P2 Quantitative disease resistance to *Phytophthora sojae* and species of *Pythium*: It's complicated. A. DORRANCE, The Ohio State University, U.S.A.
- 1006-P2 Symbiotic relationship between tomato and *Pseudomonas* in phytoremediation. Z. VERSHININA, IBG UFRS RAS, Russian Federation
- 1008-P2 Implementing robust genetic transformation and genome engineering methods for plant growth promoting *Bacillus* spp. wild isolates. P. D. CUEVAS, Chr. Hansen A/S, Denmark





Stop by the *MPMI* table near registration to meet editor-in-chief Jeanne Harris and her editorial board and learn about the IS-MPMI member journal.

Discuss publishing your research in *MPMI*

•

Learn about new significantly reduced page fees for IS-MPMI members

•

Sign up for alerts in your interest area—and pick up *MPMI* stickers to show off your research interests

•

Submit nominations for the “Top Ten Unanswered Questions” campaign

•

Learn about the new *MPMI* podcast—Microgreens





2021 IS-MPMI Congress  
JEJU, KOREA

2021 International Society  
of Molecular Plant-Microbe  
Interactions XIX Congress

**MPMI for the next 20 years**



---

25(Fri) ~ 29(Tue) June 2021  
International Convention Center, Jeju, Korea

---

For more information, visit the official website \_ [www.ismpmi.org/congress/2021](http://www.ismpmi.org/congress/2021)