

IV International Symposium on

**Postharvest
Pathology**

28 May – 3 June 2017

Skukuza, Kruger National Park, South Africa

NOTES

Table of CONTENTS

Message from Symposium Convenor

[A4](#)

Welcome Messages

[A6](#)

Invited speakers

[A8](#)

Skukuza Map

[A18](#)

Sponsors

[A19](#)

Programme

[A20](#)

Abstracts Index:

Oral Presentations

[1](#)

Poster Presentations

[56](#)

Prof. Lise Korsten



As convener of the *IVth Postharvest Pathology Symposium*, I would like to wish you a warm bushveld welcome to our beautiful country and the Kruger National Park, our pride and joy. May you experience the lion's share of the hospitality and friendship we have to offer and use every moment of your visit to explore the multitude of African offerings. Take a minute of each day to appreciate the natural beauty around you; smell the earth in the early morning hours, infuse your senses with the peacefulness, note the chattering birds, see the sunrise, a giraffe curl his tongue around a young fresh leaf, spot the pride of lions lazily staring over their kingdom, catch the sight of a sprinting cheetah, feast your eyes on the agility of the elephant, don't miss the fearsome look of a buffalo, the innocence of the rhino, the call of the African fish eagle, the majestic size

of the Bateleur, the shyness of a leopard, the unique African sunset and the flickering of the millions of stars in our southern skies. Africa is a land of contrasts, a privilege to visit, a unique experience to share with friends and colleagues and a memory to keep for life.

The most important reason for your visit to South Africa is to attend the *IVth International Postharvest Pathology Symposium* that promises to be thought-provoking, provide new information regarding disease control and novel technologies, explorative in terms of new research focus areas such as the exciting microbial biomes and to provide a platform to interact in a relaxed scenic environment conducive to knowledge sharing. Furthermore we need to link the prevention of losses and the reduction of waste throughout the supply chain and must ensure a sustainable food supply that can address the needs of our people in an ever-changing agricultural environment and globalized world. The demand for safe food is now a minimum requirement for market access and free and fair trade and has to be institutionalized in particular in developing countries and in small farming production systems, hence the importance of hosting this international symposium in Africa. The growing world population, ever-increasing extended supply chains, and irreversible rate of urbanization and climate change are also driving a focus towards precision farming and sustainable food production.

Our hope is that this fourth meeting of giants in the field of postharvest pathology will further enrich our respective disciplines and contribute towards the mentoring of the next generation of young scientists. My request is that we use this meeting to broaden our networks, link with industry and government and jointly develop the much needed framework to address the sustainable development goals and secure our global food supplies for all.

Prof. Lise Korsten:

University of Pretoria and Co-Director of the Department of Science and Technology and National Research Foundation Centre of Excellence in Food Security and Chair of the ISPP Task Force on Global Food Security.

Prof Lise Korsten

Prof Korsten is currently the Co-Director within the Department of Science and Technology, Centre of Excellence Food Security. She is also responsible for the food safety and regulatory control programmes within the DST Centre of Excellence Food Security. She is a chief editor of Crop Protection and is chairing the International Society for Plant Pathology Task Force on Global Food Security. Prof Korsten has focussed her research mainly on complementary fields of postharvest technology and food safety as related to international trade in fresh produce. She has been able to establish research teams in food safety, postharvest pathology, biocontrol and mushroom and fruit health. As a team they have been able to develop several innovative technologies to reduce diseases and prevent product contamination. The value of her research programmes can best be illustrated by sustainable industry financial support. She has been able to attract extensive national and international long term funding such as the Water Research Commission solicited research projects as well as the 7th EU Framework project "Impact of climate change and globalisation on safety of fresh produce – governing a supply chain of uncompromised food sovereignty. Prof Korsten has also developed one of the first biocontrol products in South Africa in 1992 that was patented, registered and commercialised and is still used in the fruit industry. An alternative mushroom casing material has also been developed by her team using waste products that has since been licenced for commercial production.

Welcome message

Prof. Samir Droby



Let me take this opportunity to personally welcome each of you to the *IV Postharvest pathology symposium*. This symposium is devoted to exploring next generation innovation and commercial solutions for postharvest pathology to reduce losses, enhance quality and ensure product safety. Preventing losses throughout the supply chain is critical in achieving food security and sustainability. The demand for safe produce is increasing as the world population continues to grow exponentially, and yields are threatened by global climate change. Preserving harvested commodities while maintaining their quality and safety still a challenge for the scientific community as well as the industry stakeholders.

The first ISHS symposium was held in 2010 in Leesburg, VA, USA and focused on the biological control of postharvest diseases. The second was held in 2013 in Kusadasi, Turkey, and broadened the topic to include a variety of innovative approaches for postharvest diseases management. The third meeting, held in Bari, Italy in 2015 further broadened the topic as it was held with the collaboration with the Postharvest Pathology Subject Matter Committee of the ISPP, who last met in 2011 in Lleida, Spain. The forth is being held this year in Skukuza, South Africa and it's our hope that the next one will be held two years later.

By bringing together established scientists, young scientists, students, producers and industry representatives, the current symposium will be an excellent opportunity to exchange ideas, share experiences and form new collaborations to invigorate research and development activity in the area of postharvest pathology.

I'd like to thank each of you for attending the symposium and bringing your expertise to our gathering. Special thanks to all members of the organizing committee led by Prof. Lise Korsten for all the efforts they made to set up a very interesting and stimulating program as well as making our stay in South Africa enjoyable.

Prof. Samir Droby

Chair, Postharvest Pathology SMC, ISPP

Welcome message

Prof. Chris Watkins



As Chair of the Quality and Postharvest Horticulture Commission of ISHS, I am delighted to have the opportunity to welcome you to IV International Symposium on Postharvest Pathology in Kruger Park.

I have enjoyed greatly the opportunity to attend meetings of this working group over the years – they are always of high quality and stimulating. The program this year is especially exciting with its focus on novel technology development, innovation and creative concepts in postharvest technology. The challenges of moving scientific ideas to commercial adoption remain very real, and are often more than availability.

I hope that you have a wonderful time in Kruger Park and elsewhere in Africa if you have the opportunity, and that you enjoy the comradery of meeting friends and colleagues again, but especially to take the opportunity to welcome and embrace new students and budding professionals who will be future leaders in the field of Postharvest Pathology.

Invited speaker

Dr. Noam Alkan

Agriculture Research Organization,
Volcani Center, Israel

Dr. Noam Alkan completed his Ph.D. in Plant Pathology at the Faculty of Agriculture at Hebrew University of Jerusalem at Rehovot at the year 2010. His Post-Doctorate was conducted on the subject of Fruit-Pathogen Omics Interaction together with Prof. Robert Fluhr and Prof. Dov Prusky at Weismann Institute of Science. Since 2013 he is a Researcher Scientist at the ARO, Volcani Center in the Department of Postharvest Science.



Noam Alkan lab focus on Postharvest Physiology and Pathology of subtropical fruits. The lab interest includes: Fruit stem-end microbiome, *Botryosphaeria* pathogenicity, Fruit resistance mechanism to pathogenic fungi, Anthocyanin's and fruit resistance, Mango fruit response to cold storage, and cold quarantine for subtropical fruits.

Noam is the author of 30 manuscripts and 4 book chapters. ■

Invited speaker

Prof. Gabriele Berg

Full Professor at Graz University of Technology, Institute
of Environmental Biotechnology (Head), Austria

Gabriele Berg studied biology and biotechnology at the universities in Rostock and Greifswald and obtained her Ph.D. in 1995 in microbiology from Rostock University (Germany). In 2003, she got a Heisenberg grant from the DFG (Deutsche Forschungsgemeinschaft), and in 2005 she became a full professor in environmental biotechnology at Graz University of Technology (Austria). Her interests are focused on microbiome re-



search and translation of the results into new biotechnological concepts for our environment as well as for plant and human health. Results have been published in more than 200 peer-reviewed papers and in several patents. For her results and developments she received numerous awards, e.g. Science2Business Award Austria and "ÖGUT Umweltpreis" (2011) and Fast Forward Award Styria (2015). ■

Invited speaker

Prof. Samir Droby

Agricultural Research Organization, The Volcani Center, Israel

Prof. Samir Droby is a senior research scientist at the ARO, the Volcani Center and Professor of Plant Pathology and postharvest Sciences at the Division of Biochemistry and Food Science at the Robert H. Smith Faculty of Agriculture Food and Environment, The Hebrew University of Jerusalem. Since 2013, he has been serving as the chair of the Postharvest Pathology Subject Matter Committee of the International Society of Plant Pathology. His research expertise include developing biological and natural based control strategies for postharvest diseases, mode of action of yeast biocontrol agents, Pathogenicity mechanisms of *Penicillium* species on citrus and apple fruit and resistance mechanisms



of fruits against postharvest pathogens. Prof. Droby published more than 100 articles in peer reviewed journal and 20 review articles and 25 book chapters on various topics on postharvest pathology. In recent years he has been actively involved in several international research projects and activities related to various postharvest pathology fields.

Among the research projects: Developing new approaches and strategies the biocontrol of postharvest diseases; The discovery and elucidation of the role of effector proteins in the pathogenicity of postharvest pathogens; characterization of fruit microbiome and its modulation for the control of postharvest diseases. ■

Invited speaker

Prof. Paul Fourie

Citrus Research International (CRI), South Africa

After obtaining a B.Sc.Agric. (Plant Pathology and Genetics) at University of the Orange Free State, Bloemfontein, Paul Fourie obtained BSc.Hons., MSc. Agric and PhD(Agric) degrees in Plant Pathology from Stellenbosch University. He started his professional career as a grapevine pathologist, and from 2007 as a citrus pathologist. He is currently the manager of the Southern African Citrus Improvement Scheme at Citrus Research International (CRI), the research and technology service provider to the southern African citrus industry. As plant pathology researcher he is associated with Stellenbosch University's Plant Pathology department as extraordinary professor.



His research focuses on fungicide application technology in citrus orchards and packhouses, as well as Citrus Black Spot (CBS) epidemiology. He has been directly involved in the student training of 7 PhD students and 22 Masters students, his scientific outputs include 63 scientific articles, 88 international and 134 national congress presentations.

Paul resides on the Citrus Foundation Block farm outside Uitenhage in the Eastern Cape province of South Africa with his wife Sonja and two daughters, Emma and Kara. Between work and school, the Fourie's enjoy the great outdoors and the ocean as much as possible. ■

Invited speaker

Dr. Luis González-Candelas

Spanish National Research Council, Spain

Dr. Luis González-Candelas got his PhD in Microbiology in 1990. He is now a research scientist at the Spanish National Research Council working at the Institute of Agrochemistry and Food Technology. He belongs to the Postharvest Physiology, Pathology and Biotechnology group.

His major research interests are to dissect the fruit-fungal pathogen interactions mostly in the apple-*P. expansum* and citrus-*P. digitatum* pathosystems using molecular and omics approaches. On the fruit side he has been involved in the study of the defense response trig-



gered in the fruit by the pathogens as well as the mechanisms of induced resistance. More recently he is involved in unraveling the pathogenicity mechanisms of both fungal pathogens with the aim of developing new control alternatives directed towards virulence determinants. A major milestone in his career has been the sequencing of the genomes of the three most important

postharvest fungal pathogens of citrus and pome fruits belonging to genus *Penicillium*. ■

Invited speaker

Prof. Jose Luis Henriquez

Universidad De Chile, Santiago, Chile

Dr. Henriquez completed his degree in Agricultural Sciences at University of Chile, where he started a career as a Plant Pathologist. He obtained a Master Degree in Plant Pathology, from Washington State University, and a PhD in Plant Pathology from Oregon State University. He is actually an Associate Professor at University of Chile where he has been involved in the Graduate School, creating the program of Crop Protection for the Master of Science of Agricultural Sciences. His teaching courses include Field Crop Pathology and Fruit Postharvest Pathology, lecturing in other courses as invited speaker as well.

His research has an applied approach with empha-



sis on the etiology and epidemiology of plant diseases, encouraging the integration of different tools for management of plant diseases, emphasizing crop culture management. He has been working on pre and postharvest diseases, conducting first time research on diseases of olive trees and pomegranates in Chile, editing a book for each topic. His most renowned work on postharvest diseases

was his study on the etiology and epidemiology of *Neofabraea* species causing bull's eye rot of pears. He has published 119 papers in national and international journals, book chapters and proceedings of congresses. ■

Invited speaker

Prof. Antonio Ippolito

University of Bari Aldo Moro, Italy

Full professor in Plant Pathology, coordinator of the PhD course in "Biodiversity, Agriculture and Environment" and member of the Excellence Centre "Compared Genomics in Biomedical and Agricultural Issues".

His scientific activity is documented by almost 400 publications regarding various aspects of Plant Pathology in Mediterranean crops. In particular, ae-

tiology, epidemiology, chemical, and biological control of fungal diseases of fruits, canopy, and roots were studied. For over 25 years he is carrying out research on the use of alternative control means against postharvest decay of fresh fruits and vegetables by means of physical, biological, natural substances and organic and inorganic salts. By us-



ing molecular techniques, he conducted studies on diagnosis and quantification of several phytopathogenic microorganisms.

More recently, he deals with the study on mechanisms of resistance in the host induced by various elicitors by means of gene silencing and the expression analysis of resistance genes.

In 2015 he has been convener of the "III International Symposium on Postharvest Pathology", Bari June 7-11. He is Chair of the international Workgroup "Biological Control of Postharvest Diseases", member of the international Commissions "Quality and Postharvest Horticulture" and "Plant Protection" of the International Society for Horticultural Science. ■

Invited speaker

Dr. Mduduzi Ngcobo

ARC (Agricultural Research Council), South Africa

Dr Mduduzi Ngcobo graduated with BSc degree in Crop Science from the University of KwaZulu Natal (UKZN), MSc in Agriculture (Horticultural Science) and PhD(Agric) in postharvest technology from Stellenbosch University. He has extensive experience in the postharvest industry and research. He has worked for Dole South Africa in SA where he held different technical positions and although based in South Africa, he worked in Namibia, Egypt as a Table Grapes Assistant Technical Manager. While working at Dole SA, he was seconded to Dole Europe where he was based in Rotterdam working with the quality team doing postharvest quality inspections of the different imported fruits from production countries around the globe. Dr Ngcobo also held the Research & Innovation Manager position at the South African Perishable



Products Export Control Board (PPECB). He is currently the Senior Manager: Research at the Agricultural Research Council (ARC) responsible for the Tropical and Subtropical Research Campus. His expertise include packaging technology of fresh fruit, optimization of storage requirement, development of export and shipping protocols, quality management systems including inspection services and phytosanitary issues, as well as trade regulations and policy matters. He has firsthand experience about the South African postharvest innovation system and served on the Management Board of the South African Postharvest Innovation (PHI) programme. He has published peer-reviewed articles in international journals on various aspects of packaging and postharvest quality management of fresh produce. ■

Invited speaker

Prof. Dov Prusky

Agricultural Research Organization,
The VolcaniCenter, Israel

Dov obtained his degrees at the Hebrew University of Jerusalem, Faculty of Agriculture at Rehovot. I finished his PhD in 1977. I joined the Department of Postharvest Science of the Agricultural Research Organization, at the Volcani Center in 1977 and became a full professor in 1994. In 1997 I was appointed Head of the Department of Postharvest Science and in 2002, and Head of the Institute of Postharvest Technology of Agricultural Products of the Agricultural Research Organization. On 2007 became the Deputy Director of the Agricultural Research Organization, the Volcani Center until 2010. His research focuses on the basis of resistance and susceptibility of fruits and vegetables to postharvest disease as a universal model system for understanding the mechanism of pathogen attack and host spoilage of fruit and vegetables. He has published a total of 170 reviewed articles in leading international scientific journal. He pioneered the



discovery of the mechanism of pathogen quiescence in resistant fruits to postharvest pathogens and identified first the chemical basis for fruit resistance of unripe fruits compared to ripe susceptible fruits. These leading publications have become the basis for books descriptions of the mechanism of fruit resistance to fungal attack.

He was awarded the title, "Scientist of the Year, 2002" and more recently Elected "2009 Merensky Fellow" by the Merensky Holdings in South Africa for my contribution to the world development of understating of mechanism of postharvest diseases development and control. In 2012 I was granted the "Life achievements" award for the specific contribution Israeli Agriculture and was elected as an Editor of the Annual Review of Phytopathology. ■

Invited speaker

Prof. Gianfranco Romanazzi

Marche Polytechnic University,
Ancona, Italy



Gianfranco Romanazzi completed his degree in Agricultural Sciences (with 'cum laude') in 1995 at the University of Bari, where he also completed his PhD in Crop Protection, in 1999. He joined Marche Polytechnic University in Ancona in 2001, he became Assistant Professor in Plant Pathology in 2004 and he is Associate Professor since 2014. His teaching courses include Plant Pathology (since 2001/02) and Plant Disease Management (since 2010/11).

His scientific activities have involved different aspects of plant pathology, from diagnosis and molecular characterisation of plant pathogens, to the control of pre and postharvest diseases. Together with his research team, he has applied disease-control measures both in the field and after the harvest, through environmentally friendly means (i.e., natural compounds, UV-C irradiation, ozone, hypobaric and hyperbaric treatments, low risk fungicides, resistance inducers). He has acquired good experience in the control of postharvest diseases of fruit, with his studies including the in vitro and in vivo activities of a series of natural fungicides, among which chitosan has been the most investigated. In June 2004-January 2005, part of his research was carried at the U.S. Department of Agriculture (USDA) in Parlier, California, USA, while in June-August 2015, he spent a period at the Agriculture and Agri-Food Canada Station of Vineland, Ontario, Canada.

He has been a member of the COST actions on berries (863), phytoplasma (FA0807), and endophytes (FA1103), and is currently involved in the Manage-

ment Committee of COST actions on "Sustainable control of grapevine trunk diseases" (FA1303) and "Using three-way interactions between plants, microbes and arthropods to enhance crop protection and production" (FA1405). He is part of the Management Committee of the Phytoplasma Working Group of the Italian Phytopathological Society, and he is a member

of the Scientific Committee of the Italian Platform for Organic Agriculture and of the "Monilinia.org" international network. He is part of Editorial Board for Postharvest Biology and Technology, and Journal of Integrated -OMICS, and he is Senior Editor for Australasian Plant Pathology.

He was recently invited by Postharvest Biology and Technology to edit a special issue entitled "Alternative approaches to synthetic fungicides to manage postharvest decay of fruit and vegetables: existing and emerging technologies". He is an author of more than 280 papers published in national and international journals, book chapters and proceedings of congresses. ■

Invited speaker

Prof. Dharini Sivakumar

Tshwane University of Technology,
South Africa



Prof Sivakumar has started her career at the Tshwane University of Technology, Pretoria as an Associate professor in 2010. She developed the research area in post-harvest technology and the curriculum at the Department of Crop Sciences.

In 2015 she was awarded the DST-NRF SARCHI (South African Research Chairs Initiative) funding for the Phytochemical Food Network Programme to Improve

Nutritional Quality for the consumer and she was appointed as a Full Professor. In 2017 she was appointed as an Honorary A/Professor at the Centre for Nutrition and Food Sciences, Queensland Alliance for Agriculture and Food Innovation (QAAFI), University of Queensland, Australia. She closely works with the South African Avocado Fruit industry and has currently established research collaboration with Texas A & M USA, University of Reunion

island, Reunion (France), Leibniz-Institut für Agrartechnik und Bioökonomie, Germany Marche Polytechnic University, Italy, and the University of Greenwich, UK.

Nationally she has a close research collaboration with the ARC (Vegetable and ornamental plant Institute, Sub-tropical fruits Institute), DST-CSIR Nano Center, and Plant and soil Sciences, University of Pretoria.

Her postharvest pathology research activity is focused on improving the host defence using elicitors or signalling compounds that stimulate the accumulation of phytochemicals (secondary metabolites) and the PR proteins against the postharvest pathogens. She has published 82 research articles in ISI journals and 8 book chapters. ■

Invited speaker

Dr. Joseph Smilanick

Independent Consultant, formerly
USDA ARS, USA



Dr. Joseph Smilanick's specialty is the biology and control of postharvest plant pathogens of citrus fruit and table grapes, with a thorough understanding of the production and handling of many tree and vine crops.

Dr. Joseph Smilanick is now a consultant; formerly a Research Plant Pathologist with the USDA ARS from 1983 to 2014. Services he provides include research tasks, crop loss investigations, educational seminars in shelf life and food safety, and consultation on regulatory issues. Creative, analytical, and systematic research

worker with a good grasp of experimental designs and statistical analysis. Self-motivated, internationally connected research professional widely known throughout California with a long publication record and more than 30 years of research experience on plant diseases and their control.

Author of approximately 250 scientific and technical publications with more in press. Collaborator with other scientists in projects in Israel, Spain, Italy, Turkey, Uruguay, Argentina, New Zealand, Australia, and Mexico. ■

Invited speaker

Prof. Frans Swanepoel

University of Pretoria (UP),
South Africa



Prof Frans Swanepoel is a Research Fellow in Residence with focus on Future Africa at the Centre for Advancement of Scholarship at the University of Pretoria (UP), South Africa.

He is former Deputy Vice-Chancellor Research and Innovation, and Professor at the Institute for Poverty, Land and Agrarian Studies (PLAAS) at the University of the Western Cape (UWC), South Africa.

He holds an appointment as Visiting Fellow at the Institute for African Development (IAD) at Cornell University, USA.

He currently chairs a consensus panel appointed

by the Academy of Science of South Africa (ASSAf) on the revitalisation of Agricultural Education, Training and Research in SA. He serves in various capacities, including as Board Member, and previously as Vice-Chairperson and Acting Chairperson, on the Board of the Agricultural Research Council (ARC) in SA – ministerial appointment. He also serves as board member of the

Gates-funded African Women in Agricultural Research and Development (AWARD) initiative based in Kenya; and the continental Science Granting Councils Initiative funded by DfID and IDRC. ■

Invited speaker

Prof. Shiping Tian

Deputy Director of the Key Lab of
Plant Resources, CAS, China



Ph D in Plant Pathology, Professor, Deputy Director of the Key Lab of Plant Resources, CAS. Distinguished Young Scholars and Hundred-Talent Plan Scholar.

She graduated from Sichuan Agricultural University in 1982, studied in University of Bologna, Italy, as a visiting scholar, Ph D student and post-doctoral researcher from 1991 to 1997. Then, she has been working in Institute of Botany, Chinese Academy of Sciences. In recent years, she has

published more than 100 scientific papers in SCI journals, edited 8 books (4 in English), and been granted 12 invention patents in China. Moreover, she obtained 2 achievements, one is the first class award (Science Research) by Guangdong province and the other is the second class award (Technology Research) by Ministry of Education of China, respectively. ■

Invited speaker

Dr. Rosario Torres

IRTA, Catalonia, Spain



Dr. Rosario Torres is BSc in Biological Sciences (1989) at the University of Valencia, and PhD in Biological Sciences (1995) at the Polytechnic University of Valencia. She is researcher of the Postharvest Programme of IRTA in the Fruitcentre of Lleida, and belongs to the Postharvest Pathology group.

Her research in postharvest pathology has been mainly focused in searching alternative treatments, as biological control, and chemical and physical alternatives to control post-harvest diseases in pome fruit, citrus, stone fruit

and grapes. Over the last years, her research activities has been focused on fruit-pathogen interactions in different pathosystems: pome and stone fruit, and *Monilinia* spp. and *Penicillium* spp. Together with these research lines, she is also working in the development of molecular tools to identify and quantify fungal pathogens and biocontrol agents. She has participated in several national and international projects, published 72 papers in ISI journals, 8 books and book chapters and 2 patents. ■

Invited speaker

Dr. Josep Usall

Research Institute Of Technology, Food
and Agriculture (Irta), Catalonia

Dr. Josep Usall is a senior research scientist and a head of Postharvest Department at IRTA. He is also the director of the Postharvest Technical Service which advises packinghouses and the coordinator of Fruit Net, the Plant Health National Program to optimize the use of pesticides and reduce the residues of fruits in Catalonia.

He received his B.Sc. (1991) in Agronomist Engineer from the Polytechnic University of Catalonia and the PhD (1995) in Pathology and Food Technology from the University of Lleida. He spent a period of research time at the U.S. Department of Agriculture (USDA) in Kearneysville and Parlier, in the Plant and Food Research Institute in Hamilton, NZ and in UC Davis, USA.



His research activity include the control of postharvest diseases of fruits (mainly pome, citrus and stone fruits) using several physical, chemical and biological alternative techniques and in the development of biocontrol agents, the study the epidemiology, pathogenicity mechanisms and resistance mechanisms of fruits against postharvest pathogens, mainly in *Monilinia* and *Penicillium* species.

He has published more than 140 peer-reviewed journal articles, more than 60 technical papers and 18 books and books chapters. He is the director of an International Postharvest Course and he has participated in courses in Colombia, Guatemala, Bolivia and Ecuador. ■

Invited speaker

Dr. Michael Wisniewski

Michigan State University,
United States of America

Dr. Wisniewski has achieved major scientific accomplishments in two divergent topics of research on fruit trees: environmental stress and postharvest biological control. He is a leading authority on deep supercooling in woody plants and is recognized for developing high-resolution infrared thermography to study ice nucleation. He co-patented a method of frost protection that utilizes a hydrophobic barrier and provided the first evidence of the association of dehydrin protein and its cryoprotective properties with levels of cold hardiness in peach trees, grapes, and other woody plants.

He partnered with the University of Illinois to produce the first 40,000 long-oligo, unigene apple microarray for conducting functional genomic studies and has collaborated on a genetic mapping project to identify QTLs for economically-important traits in the apple progenitor species, *Malus sieversii*. In his biocontrol research, he played a major role in developing the first, yeast-based biocontrol agent (*Aspire™*), was the first to demonstrate the ability of yeast to parasitize fungi, and demonstrated the ability of various salts to enhance biocontrol activity. He has been issued several patents in this field, and was awarded both the Federal Lab Consortium and USDA-ARS Technology Transfer Award in 1996. He was elected as an ASHS Fellow in 1998, and chosen as the USDA-ARS Early Career Scientist in 1992 and USDA-ARS-NAA Senior Scientist in 2009. He has served as an Associate Editor for the *J. Amer. Soc. Hort. Sci.*, *Frontiers in Plant Science*, and other journals. He has also served as a member of the Technical Advisory Committee of U.S.-Israel Binational Agricultural Research and Development (BARD)



Fund. He has published over 240 peer-reviewed journal articles and 32 book chapters and has had numerous speaking invitations.

He co-edited "Plant Cold Hardiness: From the Laboratory to the Field," and received the ASHS Cross Commodity Publication of the Year Award in 2000. He was also awarded the Outstanding Researcher Award by ASHS. His ice nucleation re-

search is included in a leading college textbook on Plant Physiology and his scientific photographs have won an award from the Polaroid Corp. and were part of an exhibit at the Andy Warhol Museum. He has reviewed programs on biological control in New Zealand, Colombia, and Uruguay and participated in advanced courses on plant cold hardiness in Finland and Canada. He has also assisted in teaching courses on biological control in Uruguay several times.

Along with his colleague, Samir Droby (ARO, Israel), he established the ISHS working group on Alternative Methods for Managing Postharvest Diseases and this working group has sponsored four international conferences in the past eight years and has become a principle outlet for sharing the latest advances in this critical field of research. In 2016, he was awarded Lifetime Honorary Membership in the Canadian Phytopathological Society in recognition for his accomplishments and leadership in postharvest disease research. In 2017, he was awarded the Martin Bukovac Lectureship at Michigan State University in recognition for his contribution to fruit science. He has served on the scientific and organizational committees of international conferences has mentored numerous undergraduate and graduate students, as well as postdoctoral scientists, from around the world. ■

SKUKUZA MAP



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PROGRAMME

IVth INTERNATIONAL SYMPOSIUM ON POSTHARVEST PATHOLOGY

DAY 1: SUNDAY, 28TH MAY 2017

16:00 - 18:00	REGISTRATION, SUNSET COCKTAILS, GREETINGS AND NETWORKING		
	RESTAURANT DINNER		
	<table border="1"> <tr> <td>Department of Science and Technology (DST) / NRF Centre of Excellence Food Security</td> <td>Prof. Frans Swanepoel <i>Future Africa and Food Security</i></td> </tr> </table>	Department of Science and Technology (DST) / NRF Centre of Excellence Food Security	Prof. Frans Swanepoel <i>Future Africa and Food Security</i>
Department of Science and Technology (DST) / NRF Centre of Excellence Food Security	Prof. Frans Swanepoel <i>Future Africa and Food Security</i>		

IVth INTERNATIONAL SYMPOSIUM ON POSTHARVEST PATHOLOGY

DAY 2: MONDAY, 29TH MAY 2017

07:30	Registration: Loading Presentations and Poster Mounting for Session 1 and 2		
08:00	Welcome & Introduction to the Symposium	Prof. Lise Korsten	Convenor of the Symposium Co-Director DST/NRF Centre of Excellence Food Security, University of Pretoria, South Africa
08:10	A message from the ISHS	Prof. Chris Watkins	Chair of the Commission Quality and Postharvest Horticulture.
08:20	A Message from the Chair of the ISPP Postharvest Committee	Prof. Samir Droby	Chair of the International Society for Plant Pathology, Postharvest Pathology Committee: Objectives of the Committee and targets for the ICPP in Boston 2018

PROGRAMME

THEME 1: ELUCIDATION OF HOST-PATHOGEN INTERACTIONS AND EPIDEMIOLOGY

SESSION CHAIR:		Prof. Antonio Ippolito	Previous Convener of the III rd International Postharvest Pathology Symposium, Bari, Italy
08:30	Invited Session Speaker 22	Prof. Dov Prusky	Carbon regulation of environmental pH by secreted small molecule effectors modulates pathogenicity of fungi in ripening fruits
09:00	Invited Oral Presentation 110	Dr. Rosario Torres	Exploring new pathways in the host response of apples and citrus fruit against <i>Penicillium spp</i>
09:20	54	Dr. Yang Bi	Biochemical and mitochondria proteomic evidences on sodium silicate regulates energy metabolism and ROS production during induced resistance of muskmelon
09:35	19	Dr. Noam Alkan	Increased anthocyanin in mango fruit peel are associated with cold and pathogen resistance
09:50	Poster session 1 57	Two Selected Posters Mr. Pieter Louw	Four min Flash Presentations: Epidemiology Host-pathogen interaction of <i>Penicillium ssp.</i> species on stone fruit
	53	Ms. Elritha Venter	A post-harvest disease survey on <i>Punicagranatum</i> fruit in South Africa
	10:00	Session Discussion Prof. Antonio Ippolito	Concluding Remarks
10:20	REFRESHMENTS	NETWORKING	
11:00	Invited Session Speaker 100	Prof. Samir Droby	Perspectives and challenges of microbial application for postharvest disease management
11:30	Invited Oral Presentation 52	Prof. Gianfranco Romanazzi	Induced resistance as a sustainable tool to control postharvest diseases of fruit and vegetables
11:50	63	Dr. Kerry Everett	Infection timing for <i>Colletotrichum acutatum</i> and <i>Phomopsis</i> species causing postharvest rots of avocado in New Zealand
12:05	93	Dr. Ida Wilson	The Prevalence of <i>Botrytis cinerea</i> in plum and weed tissue: An investigation to elucidate pathogen ecology, for new decay control strategies
12:20	Session Discussion	Prof. Antonio Ippolito	Concluding Remarks
12:30	LUNCH	NETWORKING	
13:20	Poster Session 1	Host pathogen interactions	

PROGRAMME

THEME 2: MOLECULAR STUDIES OF POSTHARVEST PATHOGENS			
SESSION CHAIR 13:55		Prof. Gabriele Berg	Institute of Environmental Biotechnology, Graz University of Technology, Graz, Austria
14:00	Invited Oral Presentation 62	Prof. Josep Usall	Development and application of a combined methodology based on propidium monoazide with real-time PCR to quantify viable conidia of <i>Monilinia fructicola</i> in stone fruit
14:20	99	Dr. Michael Wisniewski	Identification of quantitative trait loci controlling resistance to <i>Penicillium expansum</i> in <i>Malus sieversii</i>
14:35	98	Prof. Samir Droby	Discovery and characterisation of NLP effector family genes in <i>Penicillium expansum</i> and <i>Penicillium digitatum</i> .
14:50	76	Dr. Luis González-Candelas	Obtention and characterization of a <i>Penicillium digitatum</i> non-ethylene producer knockout mutant
15:05	Poster Session 2	Two Selected Posters	Four min Flash Presentations: Molecular studies in postharvest pathology
	95	Ms. Patricia Carmichael	Detection and quantification of <i>Botrytis cinerea</i> on table grapes at preharvest using ddPCR
	40	Mr. Charles Stevens	Baseline sensitivity and molecular identification of <i>Galactomyces citri-aurantii</i>
15:15	Discussions	Prof Gabriele Berg	Concluding Remarks
15:25	Prof. Antonio Ippolito	Summarising the Highlights of the day	
15:35	Prof. Gabriele Berg	Key Take Home Message	
15:40	Remove all posters from Session 1		
16:15	Last vehicle departs @16:30 GAME DRIVE & African Meal in the BUSH!!		

PROGRAMME

IV th INTERNATIONAL SYMPOSIUM ON POSTHARVEST PATHOLOGY			
DAY 3: TUESDAY, 30 TH MAY 2017			
7:30 Loading Presentations and Poster Mounting for Session 3			
THEME 3: ALTERNATIVE POSTHARVEST DISEASE CONTROL TECHNOLOGIES			
SESSION CHAIR 07:55		Prof. Gianfranco Romanazzi	Marche Polytechnic University, Italy
08:00	Symposium Matters of the day from the Organisers	Prof. Cheryl Lennox	Stellenbosch University, South Africa
08:10	Invited Session Speaker 112	Prof. Dharini Sivakumar	Use of elicitors as a postharvest tool to reduce decay during marketing
08:40	101	Prof. Gabriele Berg	The role of microbial volatiles in plant protection
09:10	89	Prof. Davide Spadaro	Essential oils to control postharvest diseases of apples and peaches: elucidation of the mechanism of action
09:25	32	Dr. Nikolaos Tzortzakis	Postharvest grey mould development suppressed by <i>Origanum dictamnus</i> oil vapours in tomato, pepper and eggplant fruit
09:40	38	Dr. Malick Bill	The effect of thyme oil vapours exposure on defence mechanisms for the control of anthracnose in avocados (<i>Persea americana</i> Mill.)
09:55	Session Discussion	Prof. Gianfranco Romanazzi	Concluding Remarks
10:20	REFRESHMENTS	NETWORKING	
10:50	108	Prof. Haissam M. Jijakli	Potential uses of lactoperoxidase against post-harvest diseases on fruits
11:05	50	Dr. Lluís Palou	Curative activity against citrus postharvest green mold of composite hydroxypropyl methylcellulose-beeswax edible coatings with zeolites containing Ag-nanoparticles

PROGRAMME

11:20	37	Ms. Chinele Obianom	Effect of Chitosan-based natural product (chitoplant) on the major postharvest diseases and the defence related enzymes in avocado
11:35	15	Dr. Kirsty Bayliss	Plasma activated water; an indirect method of cold plasma application for the control of <i>Colletotrichum</i> species associated with anthracnose of avocado
11:50	36	Prof. Kim Clarke	<i>Bacillus</i> lipopeptides for a novel postharvest disease control technology
12:05	82	Dr. Justyna Wieczynska	Development of active packaging solutions with natural antimicrobial compounds for organic leafy greens
12:20	Session Discussion	Prof. Gianfranco Romanazzi	Discussion and concluding remarks
12:40	LUNCH	NETWORKING	
13:20	Poster Session 2	Alternative disease control strategies	
THEME 4: INNOVATION IN POSTHARVEST DISEASE CONTROL			
SESSION CHAIR 14:15		Dr. Mduduzi Ngcobo	Research Team Manager at the Agricultural Research Council, South Africa
14:20	Invited Oral Presentation 64	Prof. Jose Luis Henriquez	Effect of a postharvest treatment with natural fungicides on the epiphytic populations of <i>Geotrichum candidum</i> on nectarines
14:40	113	Prof. Leonardo Schena	Efficacy and mechanisms of action of a pomegranate peel extract in controlling postharvest citrus rots
14:55	81	Prof. Antonio Ippolito	Pre- and postharvest alternative approaches to control <i>Alternaria</i> brown spot of citrus
15:10	60	Dr. Teresa Lafuente	Abscisic acid in the susceptibility of citrus fruit to <i>Penicillium digitatum</i> infection. Implication in the LED Blue light-induced reduction of postharvest decay
15:25	REFRESHMENTS	NETWORKING	
16:05	71	Dr NeusTeixidó	Novel film forming formulations for <i>Candida sake</i> CPA-1 to improve their biocontrol efficacy on grapes
16:20	104	Dr Arno Erasmus	Imazalil resistance management for sustainable citrus green mould control: limited options and alternatives
16:35	16	Dr Yonk-ki Kim	BioSpectra 100SC: A new biorational fungicide to control postharvest diseases of fruits

PROGRAMME

16:50	Session Discussion	Dr. Mduduzi Ngcobo	Concluding Remarks
17:00	Prof. Gianfranco Romanazzi Dr. Mduduzi Ngcobo	Summarising the highlights of the day Key Take Home Message	
17:15	Remove all posters session 2-3	Relax, bird watching or walk around the camp	
19:00	POTJIEKOS DINNER IN THE BOMA		

PROGRAMME

IV th INTERNATIONAL SYMPOSIUM ON POSTHARVEST PATHOLOGY		
DAY 4: WEDNESDAY 31 MAY 2017		
7:30 Loading Presentations and Poster Mounting for Session 4		
THEME 5: NEXT GENERATION TECHNOLOGIES FOR REAL-TIME SOLUTIONS		
SESSION CHAIR 07:55	Dr Michael Wisniewski	West Virginia, USDA
08:00	Symposium issues for the day from the organisers	Prof. Dharini SivakumarProf Tshwane University of Technology, Pretoria, SA
08:10	Invited Session Speaker 21	Dr Zhanquan Zhang The MADS-Box transcription factor Bcmaps1 is involved in sclerotia production and pathogenicity of <i>Botrytis cinerea</i>
08:40	78	Dr. Andreas Bühlmann A metagenomic approach to asses <i>Neofabraea</i> infection and dynamics on stored apples
08:55	Selected Posters Session 2	Two Posters Four min Flash Presentations: Molecular studies in Postharvest pathology
	79	Dr. Andreas Bühlmann Nanopore sequencing of the genome of a soil isolate of <i>Metschnikowia pulcherrima</i>
	24	Ms. Alicia Pretorius Evaluation of PCR-RFLP to distinguish between FGSC members occurring on South African maize
09:05	Overview 119	Dr. Michael Wisniewski Short overview of emerging trends in postharvest technology
09:20	REFRESHMENTS	NETWORKING
10:00	Invited Oral Presentation 74	Dr. Luis González-Candelas Role of proteases and iron metabolism on the virulence of <i>Penicillium digitatum</i>
10:20	2	Mr. Davide Sardella Optimizing protocols to assess the efficacy of nanoparticles as antifungal agents
10:35	18	Dr. AchourAmiri Mandela cork versus windrow groundnut drying technology: A paired comparison of aflatoxin contamination and seed germination
10:50	Dr Michael Wisniewski Open Floor Discussion regarding Novel Technologies	
11:15	Poster Session 4	Introducing posters Innovation in postharvest disease control strategies
12:00	LUNCH	NETWORKING

PROGRAMME

THEME 6: INDUSTRY PERSPECTIVE AND NEEDS		
SESSION CHAIR 12:55	Dr. Johan Fourie	Experico, Stellenbosch, South Africa
13:00	Invited Session Speaker 94	Prof. Paul Fourie Optimisation of postharvest fungicide application in citrus packhouses: Low-tech but high impact
13:30	Invited Oral Presentation 120	Dr. Mduduzi Ngcobo Optimised packaging, cold chain management and containerisation using air modelling Title to confirm
13:50	59	Dr. Marcel Wenneker New and emerging postharvest diseases in pome fruit in the Netherlands
14:05	61	Dr. Luiz Argenta Postharvest losses of apples by fungal decay and physiological disorders in southern Brazil
14:20	80	Mr. Bastien Barral Diagnostic survey on the occurrence of pineapple fruitlet core rot in Réunion Island
14:35	97	Dr. Wilma du Plooy Complex and emerging challenges facing citrus post-harvest pathology
14:50	Selected Posters from Session 4	Two Posters Four min Flash Presentations: Innovation in postharvest disease control
	68	Prof. Yongcai Li Exogenous polyamines improve disease resistance to black spot in apricot fruit
	105	Dr. Julia Meitz-Hopkins Postharvest fungicide sensitivity of South African <i>Botrytis cinerea</i> isolates causing grey mould on pears
15:00	Dr Michael Wisniewski	Summarising highlights of the day
15:10	Dr Johan Fourie	Key Take Home Message
15:15	Remove all posters Session 1 - 4	
16:00	Late afternoon game drive	Own arrangements with Park
18:00	"BRAAI" IN THE BOMA	

PROGRAMME

IV th INTERNATIONAL SYMPOSIUM ON POSTHARVEST PATHOLOGY	
DAY 5: THURSDAY, 1 ST JUNE 2017	
05:45 Depart 06:00!!	Early departure and Game viewing on way to Malelane Gate
	FULL DAY FARM AND PACKHOUSE VISITS
18:00	Back in the Kruger Park via Kruger Gate
19:00	GALA DINNER WINE SPONSORED by CITROSOL



PROGRAMME

IV th INTERNATIONAL SYMPOSIUM ON POSTHARVEST PATHOLOGY			
DAY 6: FRIDAY, 2 ND JUNE 2017			
07:30 Loading Presentations and Poster Mounting: Sessions 3 and 5			
THEME 7: DISEASE CONTROL IN THE POSTHARVEST ENVIRONMENT			
SESSION CHAIR 07:55	Prof. Paul Fourie	Citrus Research International and Stellenbosch University, South Africa	
08:00	Symposium day arrangements	Prof. Lise Korsten	
08:10	Invited Session Presentation 114	Dr. Joseph Smilanick	Effective use of disinfectants in a postharvest environment
08:40	Invited Oral Presentation 83	Prof. Antonio Ippolito	Postharvest application of disinfecting agents for controlling fruit and vegetable diseases: a brief review
09:00	111	Dr. Mohammad Mahdi Jowkar	Effect of nano silver particle, aluminum sulfate and hydroxyquinoline citrate on vase solution microbial contamination and postharvest properties of <i>Alstroemeria</i> cv. 'Vanilla'
09:15	8	Prof. Mehdi Hosseini Farahi	Effects of putrescine, acetic acid and hot water treatments on quality and shelf-life of apricot fruit
09:30	31	Mr. Juan Cristobal Arroyo	Evaluation of the efficacy of the bio-fungicide Timorex Gold in the control of anthracnose (<i>Colletotrichum gloeosporioides</i>) in avocados cv 'Hass', Cabildo, Valparaiso Region, Chile 2015
09:45	39	Mr. Lindo Mamba	Citrus sour rot management by propiconazole drench application
10:00	Selected Posters Session 3	Two Posters	Four min Flash Presentations: Alternative postharvest disease control technologies
	48	Ms. Kathryn Fiedler	Characterization and comparison of fungicide sensitivity of postharvest <i>Geotrichum candidum</i> isolates from the Eastern Shore of Virginia
	103	Ms. Catherine Savage	Sanitisation of fungicide drench solution and effects on green mould and sour rot control
10:10	Session Discussion	Prof. Paul Fourie	Concluding Remarks
10:20	REFRESHMENTS		NETWORKING

PROGRAMME

THEME 8: THE MICROBIOME IN FOOD HEALTH AND DISEASE			
SESSION CHAIR		Prof. Samir Droby	Volcani Institute, Israel
11:00	Invited Session Speaker 92	Prof. Gabriele Berg	From seeds to postharvest: The impact of the plant microbiomes on health
11:30	Invited Oral Presentation 102	Dr. Michael Wisniewski	Fruits and Shoots! Exploring the microbiome of the apple
11:50	Convenors selected Young Scientist Presentation 20	Dr. Noam Alkan	Postharvest microbiota dynamics of mango fruit stem-end in response to light, temperature and during storage
12:10	109	Prof. Haissam M. Jijakli	Preliminary study of the interactions between the apple microbiota and <i>Pichia anomala</i> strain K, a biocontrol yeast against wound diseases of postharvest apples
12:25	Discussion	Prof. Samir Droby	Microbiomes in the postharvest context
13:00	Lunch	Poster viewing Session 5	
THEME 9: POSTHARVEST FOOD SAFETY			
SESSION CHAIR		Dr. Josep Usall	IRTA, Lleida, Catalonia
14:00	121	Prof. Lise Korsten	Fresh produce safety in a postharvest perspective
14:15	122	Dr. Erika du Plessis	Microbial contamination source tracking in the fresh produce supply chain
14:30	PechaKucha	Food safety Flash Presentations: Poster Presentations Session 5	
	55	Dr. Stacey Duvénage	Assessment of foodborne pathogen presence in the peach supply chain
	85	Mrs. Charlene Coetzee	Bacterial dynamics and the prevalence of foodborne pathogens associated with the avocado fruit, <i>Persea americana</i> Mill
	41	Ms. Tintswalo Baloyi	Prevalence of foodborne pathogens on fresh produce from informal retailers in Tembisa, South Africa
	34	Dr. Antonios Chrysargyris	Assessment of mint and pomegranate extracts/oils as antimicrobial agents to inhibit growth of <i>Escherichia coli</i> O157:H7 and <i>Listeria monocytogenes</i> on shredded carrots

PROGRAMME

14:50	Discussion	Dr. Josep Usall	Brief Discussion and Concluding the Food Safety Session
15:05	Prof. Samir Droby	Summarising the highlights of the Symposium Key Take Home Message	Remove all Posters
15:20	Prof. Antonio Ippolito		
15:25	SYMPOSIUM CLOSING REMARKS	Prof. Lise Korsten	Prize for the ISHS Best Paper Prize for the ISHS Best Poster
15:30	BOARD MEETING	Rest of attendants: Game Drive - Book with UP/ Park	
19:00	Dinner in the Restaurant		Final sunset drinks at 18:00
IV th INTERNATIONAL SYMPOSIUM ON POSTHARVEST PATHOLOGY			
DAY 7: SATURDAY, 3 RD JUNE 2017			
DEPARTURE / OTHER OPTIONS			
Departure Flights to the Cape for Postharvest Symposium tour			

Index of **Abstracts**