

Scientific Symposium

# Protected Production of Fruits and Vegetables for Nutrition Security in Urban and Peri-Urban Environments

July 18, 2018

1:00 pm – 5:00 pm

World Bank Main Building, Room MC 2-800  
1818 H Street NW, Washington, DC, USA

**Webcast:** <http://ilsirf.org/event/symposium2018/>

**Wi-Fi Network:** GUEST

**Wi-Fi Password:** ewrubgerc5

Fruits and vegetables play an essential role in nutritious diets and are key to addressing health and nutritional challenges. Increasing their productivity to meet growing demand is increasingly challenged by the impacts of climate change and competition for essential natural resources. It's increasingly clear that ensuring the sustainability of the fruit and vegetable supply requires the implementation of climate smart adaptation and mitigation interventions.

Protected systems for fruit and vegetable production range from inexpensive, simple polytunnels to high-cost, high-technology production platforms, and can offer viable alternatives to rainfed, open-field cultivation of these high value, nutritious crops. Protected cultivation, particularly in low and middle income countries, has been proposed as a way to adapt production to climate volatility while also increasing supply. However, protected cultivation techniques are not suitable to all climatic conditions, or all fruit and vegetable crops. Startup costs can be prohibitive, particularly for small-holders, and profitability requires higher quality and yields, access to markets, and/or higher selling prices.

The ILSI Research Foundation and the World Bank's Food and Agriculture Global Practice are pleased to welcome you to today's scientific symposium, which will explore how protected cultivation of fruits and vegetables can be used to provide a reliable, affordable, and sustainably produced supply of these nutrient dense foods, with an emphasis on production opportunities in urban and peri-urban settings.

## Speakers



**Juergen Voegele, Ph.D.**  
The World Bank Group  
[@WBG\\_Agriculture](#)



**Morven McLean, Ph.D.**  
ILSI Research Foundation  
[@ILSIRF](#)



**Elizabeth Mitcham, Ph.D.**  
University of California, Davis  
[@HortInnovLab](#)



**Mark W. Rosegrant, Ph.D.**  
IFPRI  
[@IFPRI](#)



**Greg Thoma, Ph.D.**  
University of Arkansas  
[@Uarkansas](#)



**Richard Rosen, Ph.D.**  
American Ag Energy



**Jacques Wery, Ph.D.**  
ICARDA  
[@ICARDA](#)



**Gordon Prain, Ph.D.**  
Urban Harvest (retired)



**Erick Fernandes, Ph.D.**  
The World Bank Group  
[@WBG\\_Agriculture](#)



**Geeta Sethi, Ph.D.**  
The World Bank Group  
[@WBG\\_Agriculture](#)



**Eija Pehu, Ph.D.**  
ILSI Research Foundation  
[@ILSIRF](#)

## Join the Conversation!

The ILSI Research Foundation Twitter handle is [@ILSIRF](#). The Food and Agriculture Global Practice, World Bank handle is [@WBG\\_Agriculture](#). [#ProtectedAg2018](#) is the preferred hashtag for the symposium and [www.ilsirf.org/event/genedrives\\_july2017](http://www.ilsirf.org/event/genedrives_july2017) is the session webpage.

### Example Tweets

[🐦](#) At the @WorldBank for the Scientific Symposium: Protected Production of Fruits & Vegetables for Nutrition Security! Enjoying talks by speakers from @ILSIRF @HortInnovLab @WBG\_Agriculture @IFPRI @ICARDA @Uarkansas. Live webcast: <http://ilsirf.org/event/symposium2018/> #ProtectedAg2018

[🐦](#) Learning more about #ProtectedAgriculture at the @ILSIRF and @WBG\_Agriculture Scientific Symposium: Protected Production of Fruits & Vegetables for Nutrition Security! Join the conversation with #ProtectedAg2018 and watch the live webcast at <http://ilsirf.org/event/symposium2018/>

### Q&A

The symposium will include a panel discussion with all the speakers as well as an opportunity for questions and answers from attendees. You can ask questions in-person, on Twitter using [#ProtectedAg2018](#), or by emailing [rf@ilsirf.org](mailto:rf@ilsirf.org).

## Agenda

Time	Topic	Presenter
1:00 pm	Welcome and Introductions	<b>Juergen Voegele, Ph.D.</b> <i>Senior Director</i> Agriculture Global Practice, The World Bank Group
		<b>Morven McLean, Ph.D.</b> <i>Executive Director</i> ILSI Research Foundation
1:15 pm	Protected Cultivation of Fruits and Vegetables: Opportunities and Challenges	<b>Elizabeth Mitcham, Ph.D.</b> <i>Director</i> Feed the Future Innovation Lab for Horticulture, University of California, Davis
1:30 pm	Projected Impacts of Climate Change on Fruit and Vegetable Production Globally Through to 2050	<b>Mark W. Rosegrant, Ph.D.</b> <i>Research Fellow Emeritus</i> Director General's Office, International Food Policy Research Institute (IFPRI)
1:55 pm	Life Cycle Assessment of Fruit and Vegetable Production, Including Protected Systems	<b>Greg Thoma, Ph.D.</b> <i>Professor, Bates Teaching Endowed Professorship in Chemical Engineering</i> University of Arkansas
2:20 pm	<i>Break</i>	
2:45 pm	Controlled Environment Agriculture: The Technological Suite of Opportunities and Constraints	<b>Richard Rosen, Ph.D.</b> <i>Chief Executive Officer</i> American Ag Energy
3:10 pm	Integrated Production Systems for Nutritional Security and More Jobs Per Drop for Smallholder Farmers Under Climate Change in the MENA Region	<b>Jacques Wery, Ph.D.</b> <i>Deputy Director General for Research</i> International Center for Agricultural Research in the Dry Areas (ICARDA)
		<b>Azaiez Ouled Belgacem, Ph.D.</b> <i>Regional Coordinator</i> International Center for Agricultural Research in the Dry Areas (ICARDA)
3:35 pm	The Importance of Climate-Smart Horticulture in Urban and Peri-Urban Areas of the Global South: Policy Challenges and Interventions	<b>Gordon Prain, Ph.D.</b> <i>Global Coordinator (retired)</i> Urban Harvest, CGIAR Global Program on Urban and Peri-Urban Agriculture
4:00 pm	Panel Discussion with Presenters	<b>Erick Fernandes, Ph.D.</b> <i>Global Lead - Technology, Innovation, and Climate Smart Agriculture</i> Agriculture Global Practice, The World Bank Group
	Q&A	
		<b>Geeta Sethi, Ph.D.</b> <i>Adviser and Global Lead - Food Loss and Waste</i> Agriculture Global Practice, The World Bank Group
4:50 pm	Summary Remarks	<b>Eija Pehu, Ph.D.</b> <i>Board of Trustees</i> ILSI Research Foundation

## Speaker Biographies

### **Juergen Voegele, Ph.D.**

*Senior Director*

Agriculture Global Practice, The World Bank Group

Dr. Juergen Voegele was appointed Senior Director of the World Bank's Food and Agriculture Global Practice on July 1, 2014. In this role, he provides leadership on the Bank's lending and knowledge activities spanning issues such as climate-smart agriculture, agriculture policy reform, food and nutrition security, and agriculture value chain development.

Dr. Voegele is chair of the CGIAR System Council Board, which oversees agricultural research programs tackling poverty, food and nutrition security, and improved natural resource management around the world. Since 2016, Dr. Voegele has served as co-chair of the Global Future Council of the World Economic Forum. He is also a member of the EAT Foundation Advisory Board since May 2017.

Since joining the World Bank in 1991, Dr. Voegele has held a number of assignments, chairing the Agriculture and Rural Development Sector Board as well as the Environment Sector Board, leading the Agriculture Unit in China, the Agriculture and Rural Development Unit of the Europe and Central Asia Region, and the Agriculture and Rural Development Department of the World Bank (later recast as the Agriculture and Environmental Services Department).

Dr. Voegele holds a Ph.D. in Agriculture Engineering and a Masters in Agriculture Economics from the University of Hohenheim, in Germany.

### **Morven McLean, Ph.D.**

*Executive Director*

ILSI Research Foundation

Dr. Morven A. McLean is the Executive Director of the non-profit International Life Sciences Institute (ILSI) Research Foundation, where she works with a dedicated team on multi-sectoral, interdisciplinary scientific and capacity building programs that span agriculture, nutrition and the environment.

Dr. McLean first joined the ILSI Research Foundation in 2009 as Director of the Center for Environmental Risk Assessment, and in 2013 was additionally appointed lead for sustainable agriculture and nutrition security across the ILSI organization internationally. She has held the position of Chief of Canada's Plant Biotechnology Office, the federal regulatory authority for the assessment and release of genetically modified plants, and was President of AGBIOS, a consultancy that works internationally with governments, non-governmental organizations, and the public and private sectors on issues of policy and regulation pertaining to genetically modified foods, crops, and forest tree species. Dr. McLean has served as a technical expert on biotechnology risk assessment, regulation and policy for many organizations, including the Food and Agriculture Organization, the World Bank, the United States Agency for International Development, the United National Environmental Program and the Secretariat to the Convention on Biological Diversity, as well as many national governments.

Dr. McLean received her B.Sc. (Agriculture) from McGill University, M.Sc. in environmental biology from the University of Guelph, and Ph.D. in molecular plant virology from the University of British Columbia. She completed her post-doctoral training with Agriculture and Agri-food Canada's Vancouver Research Station.

### **Elizabeth Mitcham, Ph.D.**

*Director*

Feed the Future Innovation Lab for Horticulture, University of California, Davis

Dr. Elizabeth Mitcham is director of the Horticulture Innovation Lab, a \$37 million program funded by the U.S. Agency for International Development and managed by the University of California, Davis. As program director, she develops and manages a portfolio of 24 agriculture development projects in Africa, Southeast Asia and Central America, with research topics spanning the horticultural value chain. The Horticulture Innovation Lab's global research network advances fruit and vegetable innovations, empowering smallholder farmers to earn more income while better nourishing their communities.

As a scientist, Dr. Mitcham is an internationally renowned expert in postharvest physiology, with an emphasis on reducing food loss and maintaining produce freshness after harvest. She previously served as director of the University of California's Postharvest Technology Center, where she remains an active researcher. Through her career, Mitcham has shared her expertise with professionals and farmers from more than 50 countries. Mitcham currently serves as the Vice President-Elect for the International Division of the American Society for Horticultural Sciences (ASHS) and was previously honored as the ASHS Outstanding International Horticulturist. Mitcham joined the UC Davis faculty in 1992 as a UC Cooperative Extension specialist, and holds degrees in horticulture from the University of Maryland (Ph.D. and B.S.) and North Carolina State University (M.S.).

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**Mark W. Rosegrant, Ph.D.**

*Research Fellow Emeritus*

Director General's Office, International Food Policy Research Institute (IFPRI)

Dr. Mark W. Rosegrant is a Research Fellow Emeritus in the Director General's Office (DGO) of the International Food Policy Research Institute (IFPRI). Prior to joining DGO, he was director of IFPRI's Environment and Production Technology Division. With a Ph.D. in Public Policy from the University of Michigan, he has extensive experience in research and policy analysis in agriculture and economic development, with an emphasis on water resources and other natural resource and agricultural policy issues as they impact food security, rural livelihoods, and environmental sustainability. He currently directs research on climate change, water resources, sustainable land management, genetic resources and biotechnology, and agriculture and energy.

He is the author or editor of 12 books and over 100 refereed papers in agricultural economics, water resources, and food policy analysis. Dr. Rosegrant has won numerous awards, such as Outstanding Journal Article (2008), Quality of Communications Award (2004), and Distinguished Policy Contribution Award (2002) awarded by the Agricultural and Applied Economics Association (formerly American Agricultural Economics Association); and Best Article Award (2005) from the International Water Resources Association. Dr. Rosegrant is a Fellow of the American Association for the Advancement of Science; and a Fellow of the Agricultural and Applied Economics Association.

**Greg Thoma, Ph.D.**

*Professor, Bates Teaching Endowed Professorship in Chemical Engineering*

University of Arkansas

Dr. Greg Thoma is the Director of Research for the University of Arkansas Resiliency Center and Bates Teaching Professor of Chemical Engineering at the University of Arkansas. He served as inaugural Director for Research of The Sustainability Consortium. He has led numerous food and agriculture life cycle assessment projects: milk, cheese, milk delivery systems, yogurt, swine, poultry, corn, and beef. He serves on the steering committee for the Swiss National Research Program, "Healthy Nutrition and Sustainable Food Production."

He is the North American subject editor for Agriculture for the International Journal of Lifecycle Assessment, and has served on the scientific/technical/organizational committee for numerous international LCA conferences. He has been active with the Livestock Environmental Assessment and Performance (LEAP) Partnership since its inception acting as the Technical Advisory Group Lead/Co-lead for development of the poultry, swine, and large ruminants' guidelines. He is currently serving on the nutrient cycling and biodiversity technical advisory groups.

**Richard Rosen, Ph.D.**

*Chief Executive Officer*

American Ag Energy

Dr. Richard Rosen spent his early years in the greenhouse and florist business, first as laborer and ultimately as grower and buyer at Harry Quint Greenhouses. Later, he began his professional career at Abt Associates advising federal government agencies, and while at Abt he was instrumental in formulating the Clean Water Act. He founded a series of energy and environmental operating businesses, serving in a variety of roles including CEO, Chief Engineer, Chief Scientific Officer, President, Consultant, Chairman and Director. ERCO Petroleum Services designed and constructed fluidized beds for clients such as Clorox, Tennessee Valley Authority, Tenneco, Combustion Engineering, and others. ERCO was sold to NL Industries and its laboratory affiliate was sold to Corning. Advanced Energy Technology commercialized equipment developed at the University of Texas to measure physical properties of the earth's subsurface including resistivity for use in oil, gas and geothermal exploration. AET was ultimately merged into its Japanese venture partner, Nishon Iwa. Dr. Rosen has extensive experience building operating facilities including one to remodel landfills using a patented technology and a manufacturing system to recycle rubber for use in a variety of industrial applications.

Dr. Rosen earned a Master's Degree in Forest Science and a Ph.D. in Engineering from Harvard University.

**Jacques Wery, Ph.D.**

*Deputy Director General for Research*

International Center for Agricultural Research in the Dry Areas (ICARDA)

Dr. Jacques Wery is Deputy Director General for Research at the International Center for Agricultural Research in the Dry Areas (ICARDA), having assumed this role in May 2018.

He was formerly Professor of Agronomy and Agricultural Systems in Montpellier SupAgro, one of the components of Montpellier University. He graduated as Ingenieur Agronome (M.Sc.) in Agronomy and Mediterranean Agriculture in 1980, after which he obtained his Ph.D. in Crop Physiology in 1983 and his Habilitation à Diriger des Recherches at the University of Montpellier in 1996. He has supervised 26 Ph.D. students and published 109 papers in international journals, as well as books on crop physiology, cropping systems design, and agricultural systems modelling. He created in 2001 and chaired until 2010 a research unit (UMR System with INRA and CIRAD) on functional analysis and design of Cropping Systems, with an emphasis on perennial and multispecies systems (intercropping, relay cropping, and agroforestry). Between 2005 and 2009, he was a board member of the Seamless project on integrated modelling of agricultural systems. Between 2009 and 2018, he was the Executive Secretary of the European Society for Agronomy and is, since 2015, the chair of the Farming Systems Design network on methodologies for analysis and design of agricultural systems. He created in 2012 and chaired until 2018 AgroSYS, a joint venture between SupAgro and five private companies to support the design of sustainable agricultural systems through capacity building of students and professionals.

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### **Gordon Prain, Ph.D.**

*Global Coordinator (retired)*

Urban Harvest, CGIAR Global Program on Urban and Peri-Urban Agriculture

Dr. Gordon Prain is a consultant who advises CGIAR Centers on issues related to rural and urban food systems and food security, gender and the institutional and social dimensions of agricultural change. Most recently he was Leader of Social, Nutrition and Innovation Sciences at the International Potato Center with a research focus on the contribution of root and tuber crops to food resilience in different types of agri-food systems, including as climate-smart horticultural crops in cereal-based systems in South Asia and contributing to diversification and greater resilience of agri-food systems in hillside and highland communities.

He earlier spent 10 years as the Global Coordinator for the CGIAR Program on urban and peri-urban agriculture known as Urban Harvest, which undertook collaborative R&D in and around cities of the Global South to strengthen vegetable and livestock systems and address environmental and policy challenges. As part of this work, he participated in the Global Horticulture Initiative and was an active contributor to the Global Horticulture Assessment. In all, he has more than 30 years of experience working in participatory, interdisciplinary teams across multiple sectors to support improved livelihoods for rural and urban households. He holds a Ph.D. in social anthropology from the University of Cambridge, UK.

### **Erick Fernandes, Ph.D.**

*Global Lead - Technology, Innovation, and Climate Smart Agriculture*

Agriculture Global Practice, The World Bank Group

As Global Lead - Technology, Innovation and Climate Smart Agriculture at the World Bank Group, Dr. Erick Fernandes is focused on designing and managing climate resilient landscapes across the World Bank's agriculture investments portfolio with cross cutting linkages to the environment, urban-rural-social, and water investments. His professional career has been dedicated to facilitating global food security, sustainable livelihoods for farmers, and the conservation of natural resources and ecosystems services to ensure the equitable and sustainable development of societies globally. Dr. Fernandes has 35 years of agriculture and natural resource management experience in Sub-Saharan Africa, East Asia, Latin America, the Middle East and North Africa, and South Asia. He holds a Higher National Certificate (HNC) in Quantitative Biology & Analytical Biochemistry from Hertfordshire University (England), a BSc in Forestry from the University of Aberdeen (Scotland), and a PhD in Soil Science & Agronomy from North Carolina State University (USA).

### **Geeta Sethi, Ph.D.**

*Adviser and Global Lead - Food Loss and Waste*

Agriculture Global Practice, The World Bank Group

Dr. Geeta Sethi is Adviser and Global Lead – Food Loss and Waste for Agriculture Global Practice at the World Bank. She has more than 16 years of experience working as an economist on fragile, low-, and middle-income countries. Her work has focused on issues of rural development, service delivery and intergovernmental fiscal policies in India, Pakistan, Nepal, Sri Lanka, Mexico, Argentina, Peru, Colombia, and Honduras.

Dr. Sethi has delivered many lending programs to the World Bank Board as well as published books and articles in referenced journals on issues relating to rural labor markets, trade policy and fiscal decentralization. Previously, she worked as the Program Manager for GAFSP and was Lead Economist with the Poverty Reduction and Economic Management unit in the Latin American and Caribbean Vice Presidency of the World Bank. She has an MBA and Ph.D. in Economics.

### **Eija Pehu, Ph.D.**

*Board of Trustees*

ILSI Research Foundation

Dr. Eija Pehu joined the Agriculture Global Practice of the World Bank in 2000 as an Advisor on Science, Technology, and Innovation. She led the department's program on agricultural research and innovation and was the anchor of the Gender in Agriculture Program of the World Bank until her retirement in April 2016. Dr. Pehu continues to consult in agricultural innovation.

Prior to joining the World Bank, Dr. Pehu was a Professor of Agronomy and the Head of the Department of Plant Production at the University of Helsinki and the founder and science director of two start-up companies in the Helsinki Science Park. She earned her Ph.D. in Horticulture from Virginia Polytechnic Institute and State University and her M.Sc. degree from the Department of Crop Production, University of Helsinki with her field work conducted in Tanzania and India.

Dr. Pehu has published extensively in biotechnology of crops, and also in tropical agriculture and international development. Her major interests in development are institutional designs of national innovation systems. In all her development work, she brings in gender issues. Dr. Pehu was honored with a Distinguished Women Leader Award from Virginia Polytechnic Institute for her outstanding achievements in intellectual leadership and mentoring of young professionals.