UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (FIFRA)
SCIENTIFIC ADVISORY PANEL (SAP)
FOOD QUALITY PROTECTION ACT (FQPA)
SCIENCE REVIEW BOARD (SRB)
July 17-20, 2018 Meeting
Docket Number: EPA-HQ-OPP-2017-0617

Biographical Sketches

Charles T. Allen, Ph.D.

Affiliation: Professor, Extension Entomologist, Integrated Pest Management (IPM) Coordinator, Texas A&M University, College Station, Texas

Expertise: Forty-two years of field experience in cotton IPM in the Southern U.S.

Education: Ph.D., Entomology, Louisiana State University; MS., Entomology, Texas Tech University; B.S., Biology, Texas Tech University

Experience Summary: Dr. Allen currently serves as Extension Specialist and Associate Department Head (Ext. Entomology) with Texas A&M AgriLife Extension Service. At Louisiana State University, Allen's research project investigated bollworm management with sprayable insect pathogens including *Bacillus thuringiensis* (Bt) and studies of natural enemies in several cotton agro-ecosystems in Louisiana. Beginning in 1981, he served as Area Extension Entomologist in the Lower Rio Grande Valley, Texas where he worked on IPM and monitoring of pests in cotton and other crops. In 1983 he relocated to Fort Stockton where he worked on IPM in cotton and other crops. He managed an informally organized program to eradicate boll weevil in South central New Mexico in 1995. In 1996, he accepted a position as Extension/Research Entomologist in Southeastern Arkansas. He taught Field Crop Pest Management at the University of Arkansas at Monticello (4 years), conducted Entomology research on cotton and commercial tomatoes. He worked with producers to educate them on what to expect as they began programs to eradicate boll weevil.

In 2000, Dr. Allen began as Program Director with Texas Boll Weevil Eradication Foundation (TBWEF). He managed field operations, planned with Technical Advisory Committees, Zone Steering Committees and the TBWEF Board of Directors, managed personnel and wrote reports/proposals supporting funding efforts. In 2009, Dr. Allen was named Statewide IPM Coordinator with Texas A&M AgriLife Extension Service. His primary responsibilities were to supervise/manage 14-20 IPM Agents. He worked with them and their IPM Steering Committees to develop programs focused on producer needs. In 2012, he was named Associate Department Head with supervisory responsibility for ~ 30 Entomologists and IPM Agents.

Dr. Allen has significant experience on Society, Agency, University, Commodity, Regional and National IPM committees throughout his career. He recently served as elected Chair (2018) of the National IPM Coordinating Committee (NIPMCC). The NIPMCC works with

the Association of Public Land Grant Universities to provide input to the US Congress regarding funding National Programs in IPM through USDA.

Throughout his career Dr. Allen has conducted Entomology educational programming supporting County Extension programs, written extension and refereed publications, newsletters, and articles for the popular and agricultural press on pest management.

Panel Experience: Dr. Allen has not previously served on an EPA Scientific Advisory Panel.

Zachary S. Brown, Ph.D.

Affiliation: Assistant Professor, North Carolina State University, Raleigh, North Carolina

Expertise: Economic evaluation of resistance & other evolutionary dynamics (e.g., gene drives); bio-economics; behavioral economics

Education: Ph.D., Environmental & Resource Economics, Duke University; B.A., Mathematics-Economics, Lawrence University

Experience Summary: Dr. Brown has been an Assistant Professor at North Carolina State University since 2014, before which he worked as an Economist at the Organization for Economic Cooperation and Development (OECD) in Paris (from 2011-2013). He completed his doctoral degree in 2011 at the Nicholas School of the Environment at Duke University.

Dr. Brown's area of expertise is on the empirical and model-based evaluation of linked economic and biological dynamics, with a focus on insecticide resistance and other evolutionary dynamics (e.g., the use of gene drives for insect control). Dr. Brown's dissertation work focused on the economic evaluation of malaria vector control in sub-Saharan Africa, including a substantial component evaluating the economics of vector resistance to prevailing public health insecticides used for malaria control, via indoor residual spraying (IRS) and insecticide-treated nets (ITNs). At the OECD, Dr. Brown led a program assessing the potential for applying behavioral sciences in environmental policy. Since joining North Carolina State, Dr. Brown's research program has focused on insect pest resistance to Bt crops, including the EPA's system of Bt refuge mandates. He has published research using resistance models in economic evaluation, as well as analysis of how grower refuge planting behaviors respond to social marketing interventions. He also has ongoing work analyzing the economic implications of using gene drives for agricultural pest control.

Panel Experience: Dr. Brown has not previously served on an EPA Scientific Advisory Panel.

David E. Ervin, Ph.D.

Affiliation: Professor Emeritus of Environmental Management and Economics and Senior Fellow for the Institute for Sustainable Solutions, Departments of Environmental Management and Economics, and the Institute for Sustainable Solutions, Portland State University, Portland, Oregon

Expertise: Environmental economics, management and policy; sustainability of genetically engineered crops

Education: Ph.D., Agricultural and Resource Economics, Oregon State University; M.S. and B.S., Agricultural Economics, Ohio State University

Experience Summary: Dr. Ervin is Professor Emeritus of Environmental Management and Economics and Senior Fellow in the Institute for Sustainable Solutions at Portland State University. He has over 35 years of experience in the conduct and administration of interdisciplinary research on agricultural and environmental topics in academic, federal government and non-profit think-tank organizations. His current research focuses on innovative approaches to the management of herbicide resistant weeds and principles to guide the valuation of ecosystem services. He served as Principal Investigator of the National Science Foundation, Integrative Graduate Education and Research program "Ecosystem Services for Urbanizing Regions," and a U.S. Department of Agriculture funded project "Public Goods and University-Industry Relationships in Agricultural Biotechnology." His publications and presentations center on environmental and ecosystem service management, principally related to agriculture. During his career, he has reviewed research proposals for the U.S. Department of Agriculture, the U.S. Environmental Protection Agency and the National Science Foundation. Dr. Ervin has also participated in two national summits co-sponsored with the NRC on herbicide resistance, and reviewed a 2016 NRC report on genetically engineered crops.

Panel Experience: Dr. Ervin chaired the 2008-2010 National Research Council's (NRC) Committee "Impact of Biotechnology on Farm Sustainability in the United States." Dr. Ervin has not previously served on an EPA Scientific Advisory Panel.

Jeffrey A. Fabrick, Ph.D.

Affiliation: Research Entomologist, U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS), U.S. Arid Land Agricultural Research Center, Maricopa, Arizona

Expertise: Insect molecular biology, biochemistry, and physiology of *Bacillus thuringiensis* (Bt) mode of action and resistance mechanisms

Education: Ph.D. and B.S., Biochemistry, Kansas State University

Experience Summary: Dr. Jeffrey Fabrick is currently a Research Entomologist within the Pest Management and Biocontrol Research Unit at the USDA, ARS, U.S. Arid Land Agricultural Research Center in Maricopa, Arizona. He received his Ph.D. in 2003 from Kansas State University in Biochemistry and subsequently post-doctoral experience (two years) within the Department of Entomology at the University of Arizona. In 2005, Dr. Fabrick accepted his position as a Research Entomologist (at the former Western Cotton Research Laboratory in Phoenix, Arizona) and has held that position at the ARS facility in Maricopa for nearly 13 years. His area of expertise is to leverage the fundamental knowledge of insect genetics, genomics, molecular biology, biochemistry, and physiology to develop novel pest management strategies and preserve or improve existing management technologies. He also has been an active reviewer of grant proposals and manuscripts for numerous journals within his area of expertise.

His current research projects focus on deciphering the molecular genetics and biochemical mechanisms of resistance to *Bacillus thuringiensis* (Bt) crops and identifying the roles of multiple diverse genes essential for insect survival.

Dr. Fabrick has served on several committees, including ARS Research Molecular Entomologist position selection committee (2009); U.S. Arid Land Agricultural Research Center (ALARC) and Advancing the Undergraduate Bioscience Engagement Track (AUBET) Committee member (2011-2016); ALARC Genomic Committee (2011-2016); International Lygus Symposium Scientific Advisory Committee (2013); ARS Pacific West Area Institutional Biosafety Committee (2013-present); and ALARC Safety Committee (2017-present).

Panel Experience: Dr. Fabrick has not previously served on an EPA Scientific Advisory Panel.

Richard L. Hellmich, Ph.D.

Affiliation: Research Entomologist, U.S. Department of Agriculture - Agricultural Research Service (USDA - ARS), Corn Insects and Crop Genetics Research Unit and Department of Entomology, Iowa State University, Ames, Iowa

Expertise: Corn Insect Ecology and Genetics: transgenic corn, insect resistance management, plant-insect interactions, non-target insects, monarch butterfly conservation

Education: Ph.D., and M.S., Entomology, The Ohio State University, Columbus, Ohio; B.S., Zoology, DePauw University, Greencastle, Indiana

Experience Summary: Dr. Richard Hellmich has been a Research Entomologist with the USDA - ARS, Corn Insects and Crop Genetics Research Laboratory in Ames, Iowa for 25 years. His research focuses on European corn borer ecology and genetics, insect resistance management, and evaluation of non-target effects of genetically-engineered maize. Recently he also has focused on restoring habitat for monarch butterflies. Previously, Dr. Hellmich studied Africanized honey bees in Venezuela and Guatemala while working for eight years at the USDA - ARS Honey Bee Laboratory in Baton Rouge, Louisiana. Dr. Hellmich also is a Collaborator Assistant Professor with the Iowa State University Department of Entomology. Dr. Hellmich was co-recipient of a 2002 USDA Secretary's Honor Award for leading a consortium of scientists that investigated Bt corn and monarch butterflies. He authored or co-authored five papers published in the prestigious journal *Proceedings of the National Academy of Sciences USA* related to this topic. Dr. Hellmich also was the Agricultural Research Service, Midwest Area, 2002 Scientist of the Year.

Panel Experience: Dr. Hellmich has served as an *ad hoc* member on seven Scientific Advisory Panels for the U.S. Environmental Protection Agency (U.S. EPA), specifically panels related to plant-incorporated protectant plants on the topics of insect resistance management (1998, 2000, 2001) and non-target organisms (1999, 2002, 2004, 2009).

David A. Hennessy, Ph.D.

Affiliation: Professor, Agricultural, Food, and Resource Economics, Department, Michigan State University, East Lansing, Michigan

Expertise: Technology and risk in agricultural and food systems and markets

Education: Ph.D., Economics, Iowa State University, Ames; Bachelors Agricultural Science and Masters Agricultural Science, University College Dublin, Dublin, Ireland

Experience Summary: Dr. David Hennessy has current appointment as Elton R. Smith Professor of Food and Agricultural Policy. His research, teaching and outreach interests concern production agriculture and its interfaces with finance and risk management, industry organization, downstream food processing, and the environment. Specific current interests include crop seed and fertilizer input markets, animal health and invasive species management, cropping systems and technology adoption, land use decisions and policy, crop insurance and other risk management choices, behavioral economics in agriculture, food safety and quality as it relates to on-farm choices, and applied microeconomic theory. Recent research endeavors have included how crop seed technologies affect farmer choice of tillage cultivation practices, the impact of Bt corn seed on aflatoxin incidence, managing demand for antibiotics in production agriculture, assessments of the impacts of climate change and other drivers on grassland conversion and crop production choices in the Northern Great Plains, and decision-making processes underlying demand for crop insurance contracts. His programs emphasize the integration of microeconomic theory with empirics. Dr. Hennessy previously served on faculty at Washington State University and at Iowa State University. Dr. Hennessy had been previously named a Fellow of the Agricultural and Applied Economics Association in 2010.

Panel Experience: Dr. Hennessy has served as Peer Review Panelist for a five-year review of the U.S. Department of Agriculture's (USDA) Economic Research Service's Farm and Rural Performance and Policy Program (2017); He has served as a Peer Review Panelist for Climate Variability and Land Use Change Request for Proposals by USDA National Institute of Food and Agriculture (2017); and currently participates on two Scientific Advisory Boards for the French National Institute for Agricultural Research (INRA); Dr. Hennessy served on the National Academies of Sciences, National Research Council Board on Agriculture and Natural Resources, Committee for the Analysis of the Requirements and Alternatives for Foreign Animal and Zoonotic Disease Research and Diagnostic Laboratory Capabilities (2012). He has previously served on the USDA/EPA Committee on Biologic and Economic Assessment of the Use of Pesticides on United States Apples (1995-1999).

Anthony R. Ives, Ph.D.

Affiliation: Professor, Biological Sciences, University of Wisconsin-Madison, Madison, Wisconsin

Expertise: Modeling resistance evolution

Education: Ph.D., Biology, Princeton University; B.A., Biology and Mathematics, University of Rochester

Experience Summary: Dr. Anthony Ives is a professor of Integrative Biology at the University of Wisconsin-Madison (UW-Madison). He received his Ph.D. from Princeton University in Biology and held a postdoctoral position for 3 years at the University of Washington. He has been at the UW-Madison since 1990. His area of expertise includes theoretical modeling of insect population dynamics and resistance evolution. He also conducts field research on insect pests of alfalfa. His work is characterized by the integration of modeling, statistics, and experimental/observational data.

Panel Experience: Dr. Ives has served as an *ad hoc* member on several Scientific Advisory Panels for the U.S. Environmental Protection Agency (U.S. EPA), specifically in 2006: Analysis of a Natural Refuge of Non-Cotton Hosts for Monsanto's Bollgard II Cotton; 2009: Evaluation of the Resistance Risks from Using a Seed Mix Refuge with Pioneers Optimum AcreMax Corn Rootworm-Protected Corn; 2010: Insect Resistance Management for SmartStax Refuge-in-a-Bag. In 2008 Dr. Ives was an external reviewer of EPA's report on resistance modeling: "Insect Resistance Development Models as Tools for Determining Resistance Management Strategies."

Billy Rogers Leonard, Ph.D.

Affiliation: Associate Vice President and Program Leader for Plants, Soils and Agricultural Water Resources, Louisiana State University (LSU) AgCenter, Baton Rouge, Louisiana

Expertise: Field crops integrated pest management (IPM) systems, pesticide toxicology, insect resistance management (IRM), agricultural biotechnology

Education: Ph.D., and M.S., Entomology, LSU; B.S., Agronomy, LSU

Experience Summary: Dr. B. Rogers Leonard currently provides leadership for the LSU AgCenter's research projects and extension programs in the areas of plants, soils, and Ag water resources. In this position, he has oversight for scientists working in the disciplines of agricultural chemistry, agronomy, horticulture, environmental sciences, crop protection, agricultural economics, and renewable and natural resources. He interfaces with State, regional and National plant commodity organizations; agricultural and environmental resource agencies; and U.S. Department of Agriculture (USDA) programs. Dr. Leonard also holds an appointment as Professor in the Department of Entomology at LSU and continues to work with students. Dr. Leonard maintained multi-disciplinary research and extension programs at Research Centers and also in the LSU Department of Entomology for over 27 years. Dr. Leonard has considerable experience evaluating and helping implement a range of arthropod pest management strategies in field corn, cotton, soybean, and grain sorghum. Dr. Leonard was a team member with the Mid-South Entomologists and associated with the development of mitigation plans for insecticide resistance in multiple cotton and field corn pests. In 2006, he was named to the Jack Hamilton Regents Chair in Cotton Production and recently received the G & H Seed Company Endowed Professorship. Dr. Leonard served the Entomological Society of America (ESA) at both regional and national levels and represented the Plant Insect–Ecosystems (P–IE) Section of the ESA as Section President in 2012.

Panel Experience: Dr. Leonard has previously served on several USDA peer review panels and committees during his career including the National Institute of Food and Agriculture–Crop Protection and Pest Management (NIFA–CPPM) Competitive Grants Programs (2015, 2016). Dr. Leonard has not previously served on an EPA Scientific Advisory Panel.

Robert L. Meagher, Jr., Ph.D.

Affiliation: Research Entomologist, U.S. Department of Agriculture-Agricultural Research Service (USDA-ARS), Center for Medical, Agricultural, and Veterinary Entomology, Gainesville, Florida

Expertise: Field entomology, population biologist

Education: Ph.D., Entomology, Pennsylvania State University; M.S., Entomology, Kansas State University; B.S., Shippensburg State College (University of Pennsylvania)

Experience Summary: Dr. Robert Meagher has been employed at the USDA-ARS since 1996. Previously he was at the University of Minnesota, Texas A&M University, and North Carolina State University. His research at USDA-ARS has centered on behavior and biological control of noctuid moths, especially fall armyworm. Dr. Meagher's research has required predominantly field collecting of adults using pheromone-baited traps and collection of larvae and eggs from host plants. These specimens have been used for molecular analysis of populations for migration and Bt resistance modeling studies and for establishing parasitoid colonies. Since its invasion from the Western Hemisphere, Dr. Meagher is leading a study to collect adult fall armyworm throughout the continent of Africa. Specimens will be used in genetic analysis to identify migratory haplotypes and to determine if Bt resistance genes are present.

Panel Experience: Dr. Meagher has served on an International Advisory Panel in Africa concerning fall armyworm management in North America. Food and Agriculture Organization of the United Nations (FAO) South-South Cooperation FAW Expert Meeting, Ghana (07/18/2017 – 07/20/2017). Dr. Meagher has not previously served on an EPA Scientific Advisory Panel.

Xinzhi Ni, Ph.D.

Affiliation: Research Entomologist, U.S. Department of Agriculture-Agricultural Research Service (USDA-ARS) Crop Genetics and Breeding Research Unit, Tifton, Georgia

Expertise: Field entomologist working on insect, disease, and aflatoxin reduction research in the southern U.S. corn production system; conventional corn breeding and germplasm development for fall armyworm and ear-feeding (including corn earworm) insect resistance

Education: Ph.D., Entomology, University of Missouri; M.S., Entomology, University of Idaho; B.S. Plant Protection, Northwest Agriculture and Forestry University, Yangling, Shaanxi, China

Experience Summary: Dr. Xinzhi Ni is a Research Entomologist with the USDA-ARS Crop Genetics and Breeding Research Unit at Tifton, Georgia. He received his Ph.D. in 1993 from the University of Missouri, Columbia, and subsequently worked as a post-doctoral research associate and research faculty member at Montana State University and University of Nebraska-Lincoln, respectively. He joined USDA-ARS in 2003 at Biological Control of Pests Research Unit, Stoneville, Mississippi, and moved to his current location Tifton, GA in 2004. He has been working on host plant resistance, crop germplasm development, and insect ecology in relation to the integrated pest management.

At present, Dr. Ni contributes to three ARS research projects. They include 1) his main ARS research project under National Program 301 entitled “Genetic Improvement of Maize and Sorghum for Resistance to Biotic and Abiotic Stresses” that he serves as the lead scientist; 2) an ARS project under National Program of Invasive Pests of Crops entitled “Area-wide Pest Management of the Invasive Sugarcane Aphid in Grain Sorghum” that he serves as the co-principal investigator and in charge of the research and tech transfer work in five coastal plain states (Alabama, Florida, Georgia, North Carolina, and South Carolina); and 3) an ARS project under National Program 215 entitled “Genetic enhancement and management of warm-season species for forage, turf and renewable energy” that he contributes his entomological expertise to the related entomological research.

In addition to working as a field entomologist with emphasis on crop breeding and developing new maize germplasm with native maize plant resistance to multiple insects and diseases (including the fall armyworm and the corn earworm), Dr. Ni has also conducted considerable amount of collaborative research with colleagues on monitoring and understanding *Bt* resistance in field populations of the corn earworm (or the cotton bollworm) and the fall armyworm in the Southeastern Coastal Plains region of the United States.

Panel Experience: Dr. Ni has not previously served on an EPA Scientific Advisory Panel.

Silvana V. Paula-Moraes, Ph.D.

Affiliation: Assistant Professor, University of Florida, Gainesville, Florida

Expertise: Field crop entomology; development of economic thresholds, sampling plans, cost-benefit analysis, crop environmental manipulation, and characterization of the risk of invasive pests to cropping systems; behavior of insects as applied to Insect Resistance Management (IRM), with a focus on insect movement, host utilization, and differential exposure to Bt toxins

Education: Ph.D., Entomology, University of Nebraska-Lincoln; M.S., Entomology and Agronomy, Universidade Federal de Viçosa – MG, Brazil

Experience Summary: Dr. Paula-Moraes has a broad background in Integrated Pest Management (IPM) in tropical and temperate areas and her experience is in research, teaching, and extension in lepidopterans associated with field crops. Since December 2016, Dr. Paula-Moraes has been an assistant professor at the University of Florida, with an appointment of 70% research, working with field crops in the Florida Panhandle, especially with lepidopterans associated with cotton, peanuts, corn, and soybeans. She has also a 30% teaching appointment, and is an instructor of principles of entomology courses, IPM and IRM seminars. Previously, Dr. Paula-Moraes worked as a researcher at Embrapa (Brazilian Enterprise for Agricultural Research), Brazil. She has coordinated a research portfolio for the recently detected *Helicoverpa armigera* in Brazil: Integrated management of lepidopteron species with focus on *Helicoverpa armigera* in intensive crop production systems. Dr. Paula-Moraes was a member of the Consultative IPM/IRM Group of the Brazilian Agriculture Ministry. She also has experience working in quarantine and plant protection activities related to exotic insects. As an agricultural inspector in the Brazilian National Plant Protection Organization, at the Brazilian Ministry of Agriculture, Livestock and Food Supply. Dr. Moraes has held the administration position of Pest Risk Analysis chairman of the Brazilian National Plant Protection Organization.

Panel Experience: Dr. Paula-Moraes has served on the National Institute of Food and Agriculture (NIFA)/United States Department of Agriculture (USDA) Panel (2017) and on the NIFA Crop Protection and Pest Management, Applied Research and Development Program Area Panel Washington, D.C. (07/17/2017-7/21/2017). Dr. Paula-Moraes has not previously served on an EPA Scientific Advisory Panel.

Omaththage P. Perera, Ph.D.

Affiliation: Research Entomologist, Southern Insect Management Research Unit, U.S. Department of Agriculture (USDA) Agricultural Research Service (ARS), Stoneville, Mississippi

Expertise: Insect molecular biology, genetics & population genetics, functional genomics of Bt resistance, resistance management in Bt crops

Education: Ph.D. and M.S., Entomology, University of Florida, Gainesville; B.Sc., Biology, University of Sri Jayawardenepura, Sri Lanka

Experience Summary: Dr. Omaththage Perera is a Research Entomologist for USDA-ARS with 14 years of research experience in insect resistance management. He has served as the Lead Scientists for Bt resistance management projects of Southern Insect Management Research Unit (SIMRU) since 2007. He has over 24 years of research experience in molecular genetics of insects. His research responsibilities at SIMRU include genetics, genomics, and population genetics of insect pests of southern row crops (e.g. cotton, corn, and soybean), functional genomics of Bt and chemical insecticide resistance, and mechanisms of resistance to Bt toxins. In his capacity as the Lead Scientist for Bt resistance management projects, Dr. Perera collaborates with colleagues in developing research programs, monitors the research progress, and reports the project progress to line management. He has a broad network of national and international collaborators with research interests in genomics, functional genomics, and resistance management. These collaborative research projects include sequencing of *Helicoverpa armigera* and *H. zea* genomes (CSIRO, Australia), alkaline phosphatase and ABCC2 transporter as receptors for Bt mode of action (Jurat-Fuentes lab, University of Tennessee, Knoxville, TN), and strategic response plan to minimize the impact of *H. armigera* on agriculture in USA (USDA-APHIS [Animal and Plant Health Inspection Service]). Most recently Dr. Perera optimized CRISPR/Cas9 genome editing system in *H. zea* and *Spodoptera frugiperda* to recover greater than 80% mutation rates and successfully mutated the Cry1Ac receptor ABCC2 transporter to evaluate the functions of different peptide domains in Bt toxin susceptibility. Dr. Perera has an active research program that led to obtaining research grants exceeding one million dollars during last 10 years. Dr. Perera served as a member of a coordinated research project on "Genetics application to improve the SIT for tsetse control/eradication" sponsored by International Atomic Energy Agency from 1999 to 2003. He was a member of the International *Helicoverpa* Genome Sequencing Consortium and has served in several USDA ARS committees and work groups on subjects ranging from safety to big data. In 2016, he was invited to participate in a work group organized by USDA-APHIS to develop a strategic plan to mitigate the impact of invasive *H. armigera* on agriculture of USA.

Panel Experience: Dr. Perera has not previously served on an EPA Scientific Advisory Panel.

Julie A. Peterson, Ph.D.

Affiliation: Assistant Professor and Extension Specialist, University of Nebraska-Lincoln, Lincoln, Nebraska

Expertise: Entomology and applied ecology; integrated pest management and resistance management for field crop pests; western bean cutworm; biological control of crop pests; transgenic *Bacillus thuringiensis* crops

Education: Ph.D., Entomology, University of Kentucky; B.A., Zoology, Ohio Wesleyan University

Experience Summary: Dr. Julie Peterson received her Ph.D. in Entomology in 2012 from the University of Kentucky, studying risk-assessment of genetically modified crops, and subsequently worked as a post-doctoral associate for two years at the University of Minnesota on conservation biological control in soybean systems. Dr. Peterson has been an Assistant Professor and Extension Specialist at the University of Nebraska-Lincoln since March 2014. She is the leader of the Agroecosystems Entomology Lab, located at the West Central Research & Extension Center in North Platte. Dr. Peterson and her lab pursue research questions addressing the ecology and management of agricultural pests with an emphasis on practical applications for integrated pest management in field crops. Current research projects may address a variety of themes, such as food web dynamics, insect behavior, compatibility of pest control strategies (including biological control by natural enemies), and resistance management.

Her research supports extension programming to develop proactive educational programs in Integrated Pest Management and Resistance Management of arthropod pests of field crops grown in west central Nebraska. Dr. Peterson has developed expertise in studying the western bean cutworm, a critical pest of corn and dry beans not just in its historic range of Nebraska, but also in its dramatically expanded range in the eastern U.S. and Canadian Corn Belt. Her program includes research on the biology, ecology, population dynamics, larval movement, feeding behavior, and management of the western bean cutworm, including biological control, chemical control, transgenic control, cultural control, and resistance management for this pest.

Panel Experience: Dr. Peterson has not previously served on an EPA Scientific Advisory Panel.

Richard T. Roush, Ph.D.

Affiliation: Dean and Professor, College of Agricultural Sciences, The Pennsylvania State University, State College, Pennsylvania

Expertise: Computer modeling and experiments to develop and test strategies for delaying the evolution of resistance in insects and weeds to insecticidal crops and pesticides.

Education: Ph.D., Entomology, University of California, Berkeley; B.S., Entomology, University of California, Davis

Experience Summary: Dr. Roush's career in sustainable agriculture spans research, teaching, extension, regulation, and administration in both the USA and Australia. Prior to joining the College of Agricultural Sciences at Penn State in October 2014, Dr. Roush served as Dean of the Melbourne School of Land and Environment at the University of Melbourne (Australia, 2006-2014), Director of the University of California (UC) Integrated Pest Management and Sustainable Agriculture Programs (2003-2006), and Director of the Cooperative Research Centre on Australian Weed Management based at the University of Adelaide (Australia, 1998-2003). Prior to his tenure at the University of Adelaide, Dr. Roush served as an Associate Professor at Mississippi State and Cornell Universities. His research has focused on strategies to slow insect pests and weeds from evolving resistance to genetically modified insect resistant crops and pesticides. Dr. Roush was the first to show with both mathematical modeling and experiments that the most effective and robust strategy for delaying the evolution of resistance to insecticidal "Bt" transgenic crops would be the use of refuges of non-Bt host plants and multiple-toxin Bt crops, in which each toxin causes greater than 95% kill of the pests. With colleagues in Australia, Dr. Roush has developed and applied strategies to delay resistance to the herbicide glyphosate in weeds. His research has demonstrated for over 15 years that there have been no issues with resistance to glyphosate associated genetically modified crops planted in Australia.

Panel Experience: Dr. Roush has served on the Australian Regulatory Genetic Manipulation Advisory Committee (GMAC) from 1998-2001 and its successor, the Gene Technology Technical Advisory Committee (GTTAC), as Adviser from 2001- 2003. Dr. Roush has served on at least 3 Scientific Advisory Panels during 2004-2011 for the U.S. Environmental Protection Agency (U.S. EPA) on delaying resistance to crops with insecticidal toxin genes modeled on those from *Bacillus thuringiensis (Bt)*.

Rick Welsh, Ph.D.

Affiliation: Professor, Department of Public Health, Food Studies & Nutrition, Syracuse University, Syracuse, New York

Expertise: Social Scientists with expertise in human problem with resistance management issues

Education: Ph.D., Development Sociology, Minors: Agronomy and Entomology, Cornell University, Ithaca, New York; M.S., Food and Resource Economics, University of Florida, Gainesville; B.A., Economics, The College of William and Mary, Williamsburg, Virginia

Experience Summary: Rick Welsh is currently the chair of the Department of Public Health, Food Studies and Nutrition and a Professor of Food Studies at Syracuse University. He joined the department in August 2012. Prior to taking this position, he worked at Clarkson University as a Professor of Sociology from 2000-2012. Previous positions have included Policy Analyst with the Henry A. Wallace Institute for Alternative Agriculture (1995-1996; 1998-2000) and the Director of the U.S. Department of Agriculture's Sustainable Agriculture Research and Education Program for the Southern Region (1996-1998). He also serves as editor-in-chief for the journal Renewable Agriculture and Food Systems published by Cambridge University Press. His research and teaching focus on social change and development with emphases on agri-food systems, science and technology studies and environmental sociology. Specific specialization includes food and agricultural policy; rural development policy; and social, economic and environmental aspects of technological change in agriculture including farm nutrient and pest management, anaerobic digesters, genetically engineered crops, and integrated pest and nutrient management.

Panel Experience: Dr. Welsh has served on several scientific advisory panels, to include Panel Manager for U.S. Department of Agriculture's National Institute of Food and Agriculture Programs on Rural Development and Entrepreneurship (2011); Panel Member for U.S. Department of Agriculture's National Institute of Food and Agriculture Programs on Regional Approaches to Climate Change and Agricultural Prosperity for Small and Moderate-sized Farms and Rural Development (2010); Technical committee member for the Sustainable Community Grant Program of the Northeast Sustainable Agriculture Research and Education Program (2009); and Panel member for the U.S. Department of Agriculture's National Research Initiative Agricultural Prosperity for Small to Moderate Sized Farms (2005 and 2006). Dr. Welsh has not previously served on an EPA Scientific Advisory Panel.